

# Journal OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

AVMA Convention—Cleveland, August 19-22, 1957

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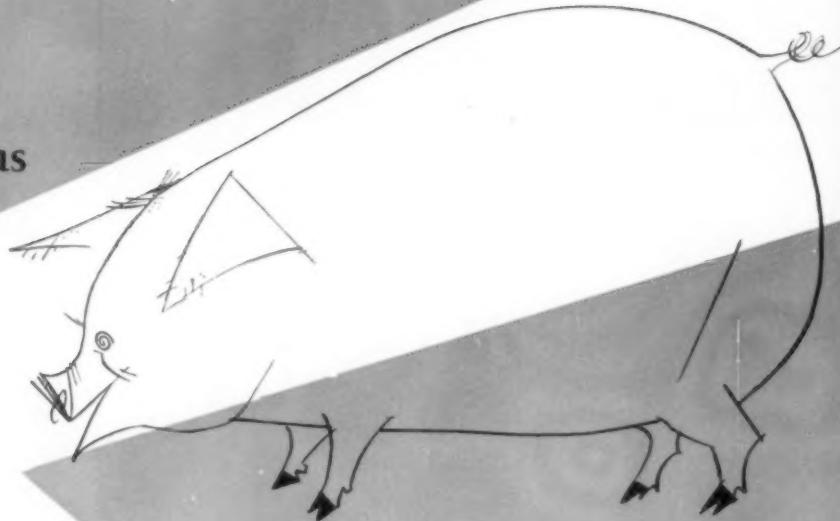
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## Correspondence

April 8, 1957

Dear Dr. Aitken:

The recent article on snake envenomation in animals in the Dec. 1, 1956, issue of the JOURNAL (p. 526) is the first we have seen of snake envenomation in cats.

The author, since he mentions a dose of 15 cc., must have used the earlier serum—Antivenin (Necrotic Crotalidae)—which was superseded in March, 1954, by a more potent and more broadly polyvalent serum—Antivenin (Crotalidae) Polyvalent (North and South American anti-snake bite serum).

We were particularly interested in the statement that "one drop of fresh venom contains 60 mg. of toxin when in the crystalline form, and that 1 mg. per pound of body weight constitutes a lethal dose for a dog." It is further stated that "one vial (15 cc. when reconstituted) of antivenin is said to neutralize 10 mg. of venom, which means that six vials would be required to neutralize one drop of venom."

Reference to an article in "Venoms," publication No. 44 of the American Association for the Advancement of Science (p. 373-380), will show the wide variation in toxicity of the various crotaline venoms. It states: "Heretofore, emphasis has been placed on the weight in milligrams of the venom neutralized per milliliter of antivenin. However, successive lots of venom (especially *Crotalus atrox*) have varied as much as 80 per cent in the L.D.<sub>50</sub> end point when standardized intravenously in 18-Gm. mice. Therefore, in order to insure a more uniform product, we have adopted as the criteria for standardization of the human dose the number of L.D.<sub>50</sub> rather than the weight in milligrams for the venom neutralized by each individual dose."

The volume, "Venoms," also contains on page 321 an article which further explains the variation in seriousness of snake bite cases, and one on page 393 which showed that 5 to 6 mg. *Crotalus adamans* (Florida rattler) venom per kilogram of body weight was usually the lethal dose for dogs. However, it was established in this study that there was great variation in resistance to the venom among the various breeds and sizes of dogs used. It is well known that the smaller the envenomated animal the larger should be the initial dose of serum. At least 5 vials of Antivenin is recommended for the initial dose in a seriously envenomated animal. It states (p. 397) "that cortisone can not be recommended as the sole treatment for poisoning with highly virulent venoms, as those of rattlesnakes and other extremely venomous species of the family Crotalidae." Many agree that cortisone and ACTH are not specific for snake bite but do have an adjunctive role in anaphylactoid

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states in severe venenation, and in altering serum sickness. They report the rapid disappearance of angioneurotic edema in severe envenomation, whether the giant hives were the result of foreign protein (venom or the horse serum) or were due to sensitivity to antibiotics that may have been given as a part of the treatment.

s/Eleanor E. Buckley,  
Philadelphia, Pa.

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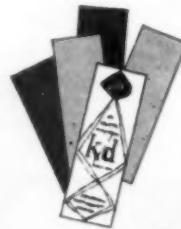


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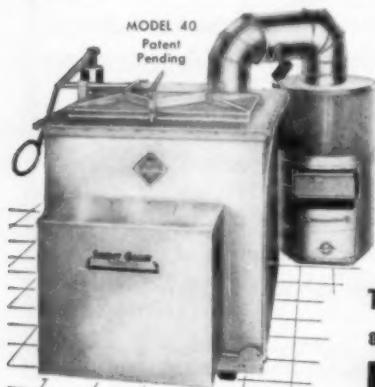


In warm weather your disposal problems always increase . . . more animals boarded, higher disease rate, etc.

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As you know, zoos present feeding and nutritional problems that are often extremely complex . . . and frustrating. Many wild animals, especially those recently captured and confined, become finicky eaters, if not hunger-strikers. Some refuse to breed. Others require a fresh vegetable and/or fruit diet that is always a sanitation problem. We found, to our immense satisfaction, that various Purina Chows were being successfully used to help solve some of these vexing problems, and to save zoos much expense, or actual loss of very valuable animals.

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# AVMA ★ Report

## Your Press, Radio, and Television Working Relationships

### Radio and Television

**BILL SCHOMATTE, Farm Program Director,  
KENS, San Antonio, Texas**

As you might gather from my title, I am a country boy. Actually, I was reared in a small town not far from here—Lockhart, in Caldwell County. It is not a big town, or a rich town, or a very famous town; it is strictly a healthy town.

I have dealt mostly with the rural side of radio and television. I travel about 30,000 miles a year, talking with farmers and ranchers and people who deal with farmers and ranchers. So, my acquaintance with veterinary medicine may be with a small segment. In fact, I am convinced more every day that it is. Thereby is the need for the part of your public relations program in which we are involved this afternoon.

I was interested in Leo Brown's comments on the definition of public relations. I know public relations is a tremendous field, but I am convinced that public relations, so far as radio, television, and the press are concerned, is just a nice way of saying something that we do not like to say, and that is "advertising," "salesmanship," or "publicity."

When we think about public relations from a radio, television, or press angle, we think of the publicity, or the advertising, or the information from the standpoint of free advertising. Perhaps it is free from the standpoint that there are no space or time rates involved but, believe me, there is no free public relations, publicity, advertising, or whatever you call it, in that it has a lot of work involved. If you place any value on your time or efforts, then it is not free.

The beginning you have to make is to decide whether you want it or not. There is probably some indecision about whether you are going to take this sort of approach toward selling the AVMA.

Mr. Brown also said that dealing with radio, television, and the press was actually a small part of their [Am. Med. Assoc.] activity, about 10 per cent. I do not believe that is true in your organization. He made the point that, whenever they have a convention, they get 150 or so folks from press, radio, and television registered in their press room, who are clamoring to give them space in newspapers, magazines, radio, and

*Presented at the AVMA Public Relations Conference, San Antonio, Oct. 14, 1956*

television. I do not believe that you would find that true, and the main reason is that you do not know much about us, and we do not know much about you.

We are just as interested in getting better acquainted with you as you are in getting better acquainted with us. So, where are we going to start? We are busy with our jobs and you are busy with yours. We are going to have to find out how we can better serve each other.

In my own particular field, farm radio and television, I do a great deal of traveling, looking for the type of story and information that will interest farm folks, things they need to know. So, I am a pretty good fellow for you to get better acquainted with—for you to use. I have time on the radio and television that I am just dying to fill with interesting, valuable information for the farm folks who listen to me, or watch me. I like to feel that I have the ears and eyes of most of them.

Your job is to put into my hands the proper information that those people ought to have. We must get better acquainted. You fellows are busy practitioners and yet, apparently, you have another job to do, because folks do not know enough about you and what you are doing.

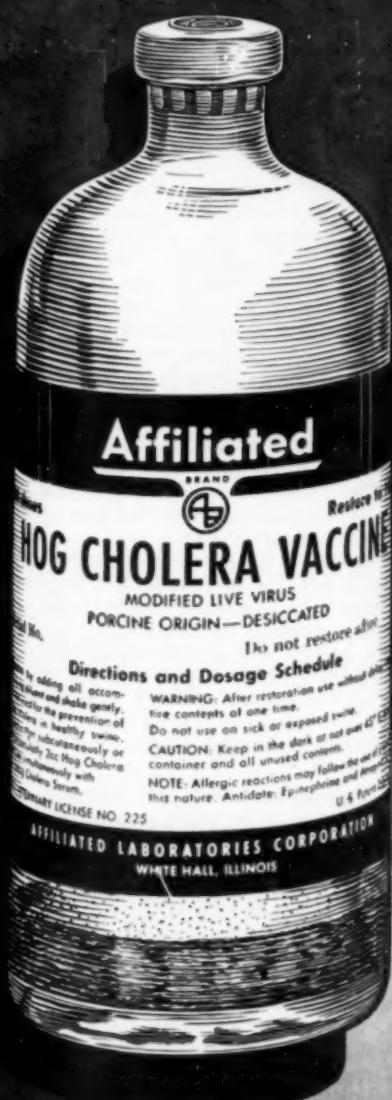
When I knew I would be on this panel today, I decided it would be a good idea to find out what the public, particularly the part of the public that I deal with, thinks about you as veterinarians. I asked a lot of farmers and ranchers: "What do you use your veterinarian for?"

I was somewhat alarmed to find that he was sort of a last court of appeal or a fellow that is called in when the cow is down and can not get up. I got a lot of answers but frankly, fellows, most of them were just about like that.

Of course, I know that that is an advertising job. That is why I say that part of your public relations is advertising. You do not advertise, I understand. So, we get back to call it not "advertising" but "public relations."

My farm and ranch friends need to know

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**vaccine**



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thru PROFESSIONAL  
and ETHICAL channels  
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that there is a time for you to get on their team, long before the cow is down and cannot get up. My farm and ranch friends need to know that you are working for them long before they ever call you out to see their sick cow. They need to know there are a lot of you that never go out to see a sick cow because you are doing other important jobs.

What I am trying to say is that we have to get the story across that veterinary medicine is a wider field than doctoring the sick cow, or giving a dog a shot for rabies, or spaying a heifer.

We can use this information in a number of ways in television and radio. We like to have you people on radio and television, whenever the occasion presents itself. We want this information of what you are doing and what is new in the field of veterinary medicine.

In television, we like to have visual ways of telling that story, and we need help in getting that material. You are busy, and we are busy, too, but you are going to have to take time or have someone take the time to get that material into our hands.

I say to you that there is a place in radio and television for a tremendous selling job, a tremendous educational job for the veterinary profession as a whole, and you will find the radio and television industry willing to work hard on your team, once we are shown how we can do that.

#### The City Press

L. C. FAY, Sunday Editor,  
San Antonio Light, San Antonio, Texas

First, I want to define public relations according to what I believe is the finest definition. It is not mine. I asked Tom Browner, who is the Southwest Texas Company representative in Houston, "How would you define public relations?"

He said, "Public relations is simply the process of causing a friend to exist where previously there was an enemy or a void."

Your chairman has suggested that I deal with precise ways and means. "How can I prepare the copy? When shall I get it in to meet the deadline?"

The answer is, "It doesn't matter a damn." Get it in there in time, of course, but get the information in. That is the No. 1 requirement.

After all, you people are veterinarians; you are not newspaper writers. We think we are newspaper writers and, certainly, we know we are not veterinarians. Therefore,

let us all stick to our own lasts. When you have something of news value, telephone or come down in person, or give us all the information in a letter, plus your telephone number. If it is vital enough, and you have left out some important aspect, the editor or reporter will get in touch with you. But those are mechanical things. In TV, and I presume, too, in radio, a great deal more preparation is involved because, obviously, you can not expect the director of a TV program to bring all your props in. But I say, to get effective information into the newspaper, let the paper know what is going on, and far enough in advance so that it can be handled at a time when it will do you some good.

If there is any mechanical piece of advice I can offer, it is this: Bear in mind that the Sunday paper is not printed at 5:30 a.m. Sunday. A great deal of it is printed Thursday night—that is, the previous Thursday night. A lot of it is printed Friday morning, Friday afternoon, and Friday night. The main news section, alone, remains to be handled on Saturday. Naturally, space is tight and space and time are limited.

If you come in Saturday with the announcement of a meeting taking place on Monday, it is perfectly apparent that that announcement is going to get kicked around. It is simply a matter of time and available personnel. Newspapers nowadays, like all other businesses, operate in the face of rising costs, both labor and materials.

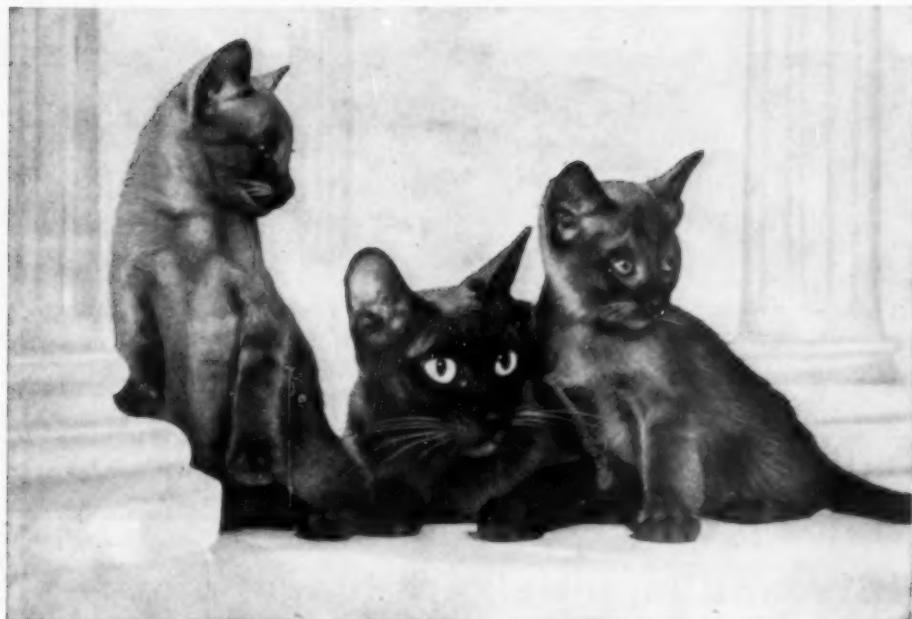
By the time our particular Sunday edition, our late morning home delivery edition, goes to press Saturday night, there will be in the city room the news editor, the city editor, and the makeup editor—nobody else. The city editor is trying to get all the news into the home delivery edition. That will include a murder over on the West Side, a \$15,000 fire in the South somewhere; there might be three or four people dead from automobile accidents down by Pleasant.

Every once in a while, he will shuffle through his papers. "Here is a notice from the veterinarians' association. The hell with that! If they can't get it in on time, we are not going to bother with it."

I am not quoting me, but I am quoting the Saturday night city editor, because I know him personally—and he is not much different on any other paper.

So, if you have a notice of a Monday meeting, get it in the previous Monday. You have known about it for that long, at least.

However, meetings are not your No. 1



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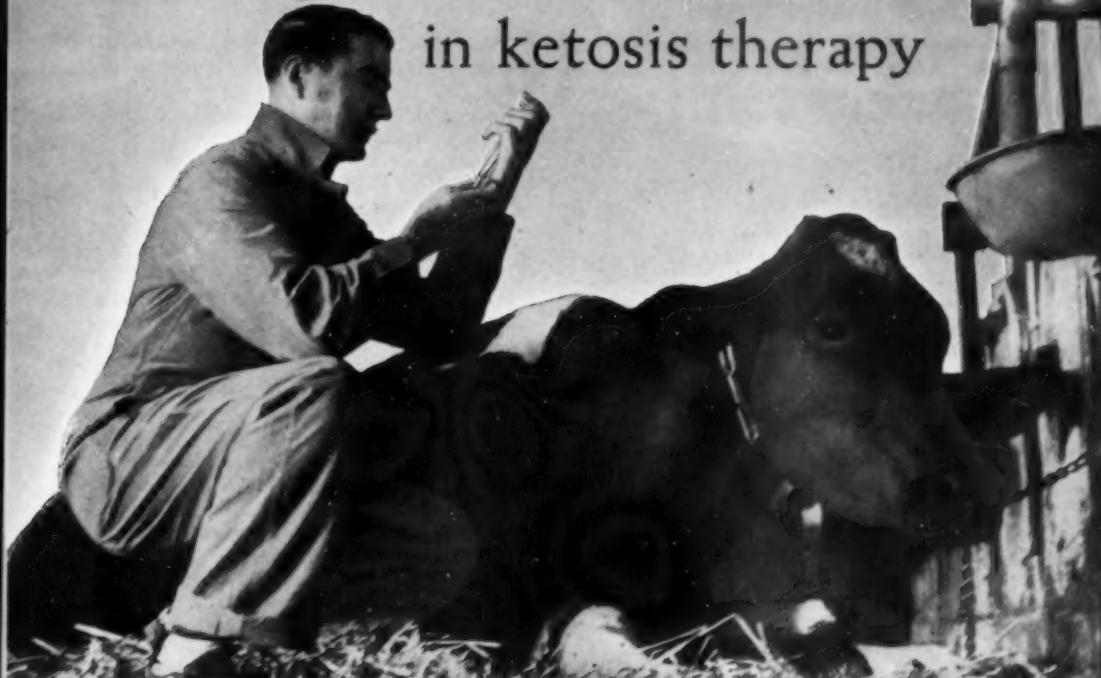
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## AVMA REPORT — Continued

concern in public relations, and here is the point at which we are probably all going to part company. The fact is this: If you want public relations, go out and get it. All right, how?

Does that mean write three paragraphs and mail it to your newspaper, or to your TV or radio station? No, it does not! It means do something newsworthy.

Frankly, I would level this criticism at not only the veterinarians of my acquaintance but every professional group I have ever rubbed elbows with: You are too timid; you are rooted to a code which worries you, for fear you are going to trample on a colleague's foot. What difference does it make if you do? If you have more benefit than loss of goodwill from something, I say do it. When I say do it—do something that promotes public relations—I say do something that will be so newsworthy that no newspaper that can lay claim to that name will dare to ignore it.

All right, how do you do it? I can offer only one simple case of what I take to be a professional retirement from the scene, right here in my own home town. Nine and one half years ago, I came down from Yankee-land, and I have been with the *Light* for eight years. But all of those nine and a half years public scandal No. 1 in San Antonio was the city dog pound and, believe me, it was. I won't say it is, because current efforts have cleaned it up and made it at least something that we need not be ashamed of.

One of these reform efforts constituted keeping dogs that were to be gassed warm in cold weather. In other words, "We won't put them out in the open kennels now, we will let them enjoy their last few minutes in this vale of tears." That is one improvement. Another constitutes more humane methods of putting them to death. But what about putting dogs to death? Must that happen? I do not know; I like dogs; I have always had a dog around. That is the nearest I come to knowing anything about veterinary medicine. But I believe if the veterinarians of this community would get together and make enough noise, they could make a real improvement in San Antonio's dog pound situation.

Has anyone done it? Well, perhaps there have been isolated efforts here and there but nobody, no group, has made noise enough for it to come to my attention. If the veterinarians of my community were organ-

ized and would make noise about some such problem, the paper would not be able to ignore them.

Look at it this way, newspapers are business enterprises as well as public servants. We want more circulation. The more circulation we have, the higher we can charge for our advertising, the more money we make, and the more money, eventually, I get. So, naturally, I am just as interested in circulation as I can possibly be.

So, how do we get circulation? What sells newspapers? Fundamentally, my friends, conflict sells newspapers. A good fight that is worth an eight-column streamer across page 1 will sell more papers.

Newspapers all over the country learned that many years ago, with this result: An ordinary run-of-the-mill wrangle will be fostered and prodded and poked until it becomes front page news. I do not say that is good; I say it is inevitable because, after all, we are concerned fundamentally with building circulation, and we build circulation by telling about conflict.

There is not a community in the country, or very few, where veterinarians can not find things wrong with something having to do with animals, if it is no more than the operation of the local S.P.C.A. You can stir up a rumpus without half trying. If, in stirring up that rumpus, you have a socially desirable goal, I think God would forgive you for stirring up the rumpus, and I say get busy and do it.

I think you need organization and news-making within your own communities. You make the news, brethren, and we will print it, I can promise you. But if you are too timid, if you are afraid that Dr. Smith is going to get 2 inches more newspaper space than Dr. Greene, you are licked before you start.

So, I urge you to look at public relations as a device by which you can make yourselves articulate within your community.

### The Farm Press

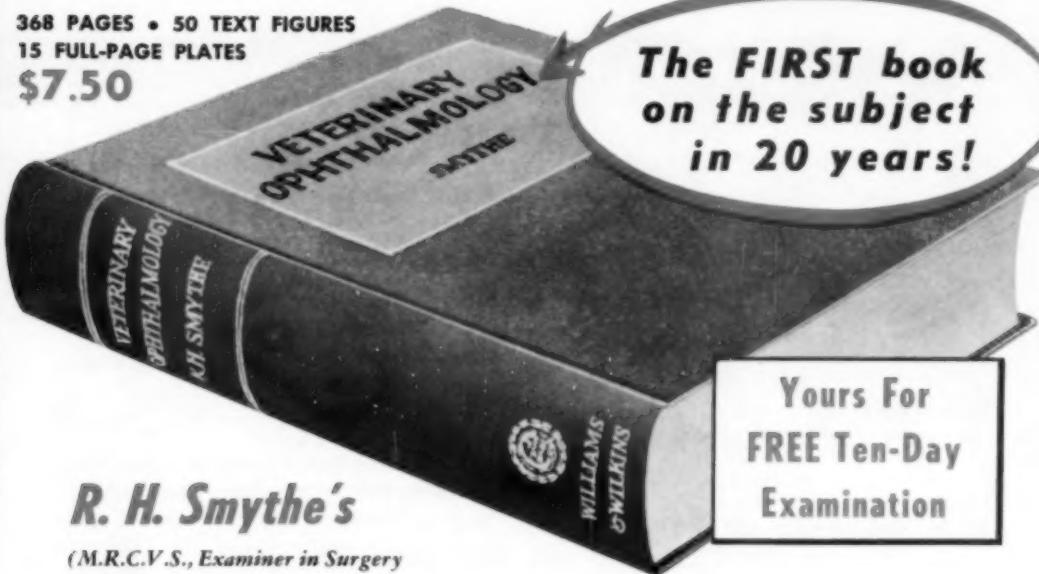
C. G. SCRUGGS, *Progressive Farmer*,  
Dallas, Texas

At the outset, touching on the general, broad subject of public relations, I believe my relationships with veterinarians, and the relationships of most of the members of the farm magazine field, are excellent. Yet, I do not think that the veterinarian's public re-

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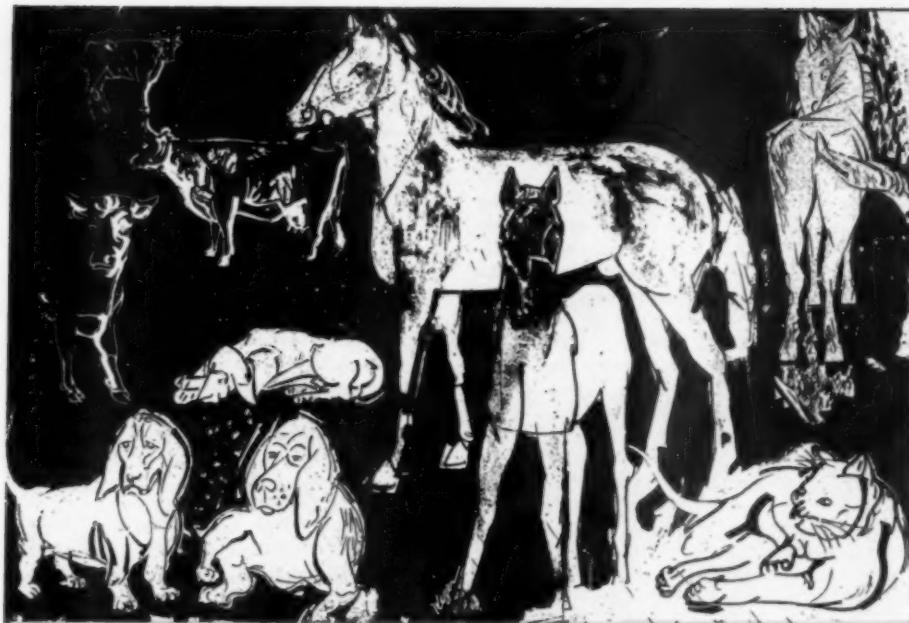
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## AVMA REPORT — Continued

lations with the general agricultural population, as a whole, is good.

A lot of people regard veterinarians as a cross between an old-fashioned horse doctor and a small town patent medicine purveyor. That is being brutally frank, and I apologize for it. But, I have relationships with veterinarians in several different ways. First, I have a small stock farm in central Texas. I see one veterinarian in that way. Working on a publication, I see them as a news source. Beyond that, I represent the American Agricultural Editors Association on the National Brucellosis Committee. So, I come in contact with veterinarians in the regulatory field.

I also get out in the country and work closely with veterinarians in Texas and in the South on many problems. In talking with farm and ranch people, I find they regard the veterinarian with—I don't know whether you would call it awe or skepticism. They do not know him very well. Certainly, your job then is to get to know farm people better.

My own relationships with veterinarians started in a simple, easy way—I rode one day with one of them from College Station, Texas, to Fort Worth, Texas, and I had a very enjoyable time—I admit it was the first time I recognized that veterinarians are human beings.

Valuable time could be spent by veterinarians getting to know the people who handle news.

Let me put it this way, you have a problem and you think there should be something in the press about it. If you know me and can get me on the telephone and say, "Charlie, we have a hell of a problem, here is what it is," nine times out of ten I will respond, "We will do something to try to help." Yet, if you do not know me and I do not know you, you probably will not get as good a hearing.

So I suggest, particularly with farm magazines, because we spend more time developing stories, go to meet your editors. The president of the association, as was mentioned a while ago, should invite the farm editors to the meetings. This is the first American Veterinary Medical Association convention I ever attended. We have some 40 people on our editorial staff throughout the South, and I do not know that one has ever attended any of your national meetings. Certainly, we ought to be represented. We have not shown the proper interest but, on the other hand, I do not believe you have

made us aware of your meetings. I hope you will do so.

Often, a farm magazine has a problem of interpretation. We hear about a situation or a disease and we do not understand it. A veterinarian can do a valuable job if he will with the press, get the meat out of what is going on and let us know about it. For instance, in looking through some of the abstracts in the back of the program I saw this title: "Clinical Experience with Tranquilizing Agents." To a lot of people who are not familiar with this field, that does not mean a thing.

If I were editor of a general interest publication, that would be an ideal feature story. A skillful writer, such as Mr. Fay, or members of his staff, could take that subject and make an extremely interesting story for a Sunday magazine. Everybody is interested in tranquilizing agents. A lot of people take them. The idea of giving them to dogs—surely, they would be interested.

One of the things a veterinarian can do is to interpret to the press in his area interesting developments in veterinary medicine.

Another need is for people who can not only interpret what your special functions and interests are but who can put them together in a manner that we can understand, so, that the fog and double talk are cut out of it. Veterinarians, like extension veterinarians and others, can cut the fog out of the problems in veterinary medicine and, thereby, render a real service not only to their profession but to the individual veterinarian.

I definitely commend the trend in many states of employing veterinarians to take the message to the general public.

Three final points: (1) I do not believe the general public realizes that the veterinarian is a highly trained, extremely skilled person. So I suggest that you launch a campaign to inform the general public that the practitioner of veterinary medicine is a highly skilled, well-trained man, who is a fine public servant.

All of you, when you think of the general practitioner of human medicine, the old country doctor, have a feeling of nostalgia. You think, "Well, he was a real nice guy. He has done a lot of good things for people." But doesn't the veterinarian render just as valuable service to the people in his community? Yet I do not know that I have ever heard of a veterinary practitioner-of-the-year being selected for his service to his community. That would certainly be one of

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## AVMA REPORT — Continued

the ways that you could sell to the general public the fact that the veterinarian is a skilled man and a public servant who is interested and dedicated to helping his fellowman.

2) In going around various parts of the country I found, in some cases, veterinarians' offices that looked like hell, to be real honest about it. I know that none of you, if you are practitioners, have that kind of an office, but all of you have seen them. They certainly the the worst kind of public relations that anybody selling any profession or product could put forward.

I think a campaign, perhaps, to brighten up veterinarians' offices and their appearance would be helpful in humanizing the veterinarian in the eyes of the public.

In contrast, I have a Collie so I go to see a veterinarian in Dallas. I take my dog into a nice-looking building that has a floor just about like this one. The office is clean and air-conditioned. The veterinarian is in a clean, white jacket and, often has a pretty receptionist. He has spotless rooms where he either vaccinates or operates; the kennels are clean and well kept.

In contrast, you go to some other veterinarian's office. The door probably will not open. There is a pile of bloody boots or overshoes lying beside the door; some blood-stained ropes piled on the seat of the chair. His instruments are piled over in the corner in a helter-skelter way; a stack of empty serum bottles in another corner. I am not making this up. I saw it not very long ago, unfortunately. You should, and I am sure you already do, encourage your people to put on a good front to the public.

3) I believe the veterinarian should assume a greater position of leadership in worthwhile activities that concern agriculture. Our publication for the last four or five years has been spending a lot of time and money to help push this drive to eradicate brucellosis. In connection with that, I have come in contact with a number of veterinarians, and have found probably 99 per cent of them extremely able men, hard-working, willing to do anything that you ask, and more. But, in some cases, I have found them not willing to assume the leadership that men with their training should assume.

Sometimes I found they tried to hide behind their Code of Ethics rather than become embroiled in a little controversy. A veterinarian should assume a position of leadership in his local agricultural organizations, and people will not think he is trying

to get some extra practice by so doing. He is a man who is trained; he is intelligent, and he should be able to render a valuable service. I would certainly think that it is part of your public relations program to assume more leadership at the local level and it would certainly be to the veterinarian's benefit. You do not find many men who do. Perhaps you have some rule that prevents it, I do not know.

In this field of writing or publicity, some publications maintain the position that they should be neutral, that you present the facts on this side and that side, and let the reader make up his own mind. Anyway you look at it, that is a kind of fence-straddling. I do not believe that any publication or individual renders a real service by fence-straddling. Therefore, I would suggest that you take positions and be for something or against it, and not just ignore it.

I apologize if I have offended anybody, but you know how it goes when you are invited to speak—you can always think of all the bad things that the other guy does, and it becomes a question of "don't do as I do but do as I say." So, if you will take my remarks in that light, I will thank you.



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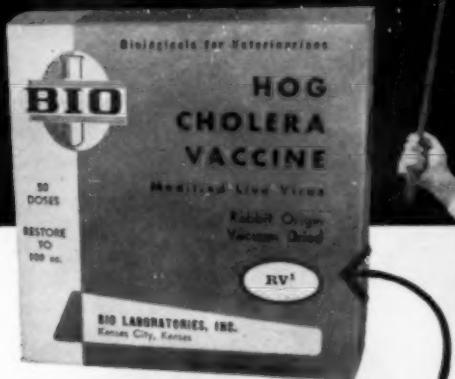
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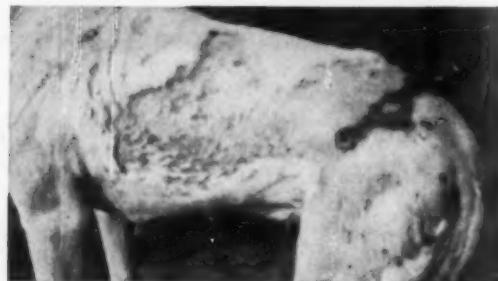
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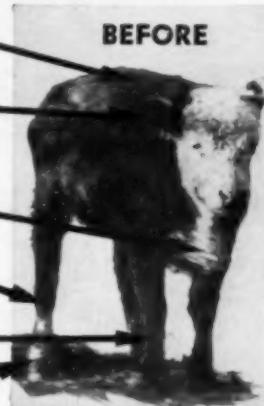
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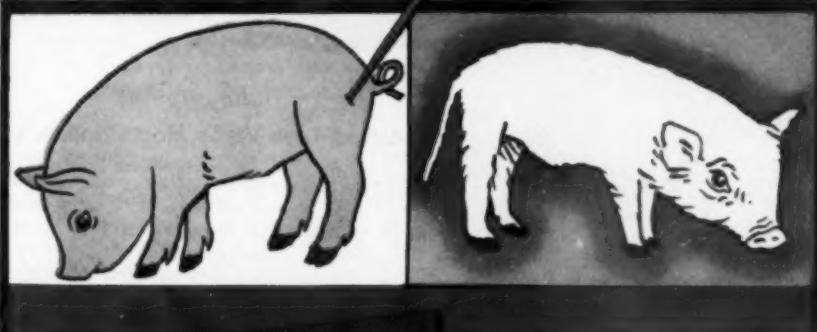
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## An Epizootiological Study of Listeriosis

JOHN W. OSEBOLD, D.V.M., Ph.D.; GORDON SHULTZ, D.V.M.;  
E. W. JAMESON, Jr., Ph.D.

*Davis and Sacramento, California*

THE IMPORTANCE of wild fauna in the epizootiology of listeriosis in ruminants might be inferred from the wide host range of the organism. More than 26 species have been found<sup>1</sup> to serve as natural hosts for this bacterial parasite. Indeed, the first isolations of *Listeria monocytogenes* in laboratory rodents<sup>2</sup> and in gerbilles<sup>3</sup> suggest that this organism may be perpetuated in nature by a host-to-host cycle that does not necessarily include man or his domestic animals. Such an infection chain would not exclude the possibility for transmission of the agent within species of domestic ruminants. This would be very likely when the *Listeria* process results in abortion, thus permitting the temporary expulsion of large numbers of bacteria. However, listeriosis is frequently observed<sup>4,5</sup> to persist in certain areas in which the disease becomes enzootic. In these situations, it is reasonable to give some attention to the scope of *Listeria* infections and to probe the epizootiological question from a broader biological aspect.

### HISTORY

The history of the area under study in this report is typical. Listeriosis among sheep appeared suddenly in epizootic proportions in 1951. In six weeks, 11 ranches became involved, with 255 deaths occurring from *Listeria* encephalitis among 14,500 ewes and lambs. Some operators lost 5 per

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This investigation was supported, in part, by a research grant (E1080) from the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, Public Health Service.

The authors express their appreciation for the cooperation of Dr. M. Schmidt, Jr., practicing veterinarian, and G. Stewart, rancher, Fairfield, Calif.

cent of their animals, while others had only scattered cases. Occasionally, sporadic deaths were reported in the district during the following years, indicating a smoldering enzootic problem. In February, 1956, the incidence of the disease again increased, with five ranches in an area of about 10 square miles having sheep losses totaling 97 animals. Four of these premises had been involved in the 1951 outbreak and the fifth ranch was an adjacent property. In addition, an adult Hereford cow from a herd of several hundred died of encephalitis while on pasture about 2 miles from the involved sheep area. The brain of this animal also yielded *L. monocytogenes*. The disease, in domestic animals in this district has always occurred in January, February, and March.

The area is located in the southern part of Solano County, California, which has a flat to low-hill terrain. This portion of the Sacramento Valley is used principally for grain crops or sheep pasture. The sheep are in the open most of the year, with a few bands using lambing barns. Silage and grain supplements are not fed, although additional hay is provided occasionally. There are comparatively few cattle in the area.

### METHODS

Following the 1951 epizootic, it had been decided that when the next one occurred among the sheep, an initial investigation should be made on the occurrence of listeriosis among other species. During March, April, and May, 1956, a total of 107 wild mammal and bird specimens was collected. Some were examined fresh and others were frozen at -20 C. until they could be necropsied. Cultures were made from the livers and spleens, also from certain organs and excretions likely to be important as pathways for exit of the agent from a carrier host (table 1).

Tissues were removed aseptically, a different set of sterile instruments being used to obtain each portion. About 1 to 2 Gm. of each organ was ground with a mortar and pestle. Several portions of the pastelike tissue were then streaked on cow-blood agar plates and also on the same medium containing 0.05 per cent potassium tellurite.<sup>6</sup> The

plates were incubated at 37°C. and were examined repeatedly for significant growth before being discarded after five days. In addition, all of the crushed tissues remaining in the mortars were suspended in a few milliliters of tryptose broth and placed in tubes. These tubes were refrigerated at 4°C. for 45 days and again subjected to bacteriological culturing. Previous work<sup>1</sup> had indicated the importance of reculture to avoid missing isolations of *L. monocytogenes*.

### RESULTS

When the collection trips began, certain epizootiological information came to light from talking with the farmers. Several people had observed sick skunks. Since the skunk is nocturnal in its habits, the unusual actions of some of these animals during the daylight hours had attracted attention. One skunk, observed wandering aimlessly by the side of a well-traveled road, was wet from walking through puddles of water; at the same time, another skunk was standing in the middle of the road forcing traffic to move around it. Both were shot and the heads were sent to the public health laboratories where examinations for rabies were made. They were negative. Unfortunately, the carcasses were not necropsied.

There were often repeated stories that

something had been wrong with the raccoons and skunks during that winter. One farmer had seen a raccoon walking slowly across an open field as early as November, 1955. Since it was near death, he shot it and left it to the carrion feeders. We learned of 10 raccoons and 24 skunks that had been seen either sick or dead. The skunk carcasses were found near den openings; therefore, many others may have died in their dens. A federal trapper assigned to collect specimens for this study toward the end of the outbreak in sheep (April) was unable to find raccoons in the area. He located several skunk carcasses but very few live animals. These two species had been numerous in that section of the county. The events suggested that there had been a drastic population decline of these animals.

No raccoon material was available for study but portions of 5 skunks were obtained, 2 of which were brought in by the trapper after the disease had subsided (May). The last 2 specimens yielded nothing of interest.

The other 3 skunks were found during the period when the sheep were dying. One which was shot after it had been observed

TABLE I—Numbers and Sources of Tissues Cultured for *Listeria monocytogenes*\*

Mammals	Liver	Spleen	Kidneys	Bile	Urine	Intestinal contents
Jack rabbit						
<i>Lepus californicus</i>	29	27	28	18	16	26
Ground squirrel						
<i>Citellus beecheyi</i>	13	12	14	5	2	11
Muskrat						
<i>Ondatra zibethica</i>	3	1	1	...	...	...
Striped skunk						
<i>Mephitis mephitis</i>	5	5	4	4	2	5
House mouse						
<i>Mus musculus</i>	15	13	15	...	...	12
Field mouse						
<i>Microtus californicus</i>	1	1	1	...	...	1
Harvest mouse						
<i>Reithrodontomys megalotis</i>	5	5	5	...	...	5
Deer mouse						
<i>Peromyscus maniculatus</i>	2	2	2	...	...	2
Birds	Liver	Spleen	Kidneys	Bile	Urine	Intestinal contents
Buzzard						
<i>Cathartes aura</i>	3	...	2	2	...	2
Seagull						
<i>Larus sp.</i>	3	2	1	...	...	3
Red-tailed hawk						
<i>Buteo jamaicensis</i>	6	2	3	1	...	5
Brewer's blackbird						
<i>Euphagus cyanocephalus</i>	9	9	9	...	...	...
Crow						
<i>Corvus brachyrhynchos</i>	3	3	3	3	...	3
Linnet						
<i>Carpodacus mexicanus</i>	7	7	...	...	...	...
Western meadow lark						
<i>Sturnella neglecta</i>	1	1	...	...	...	...
Golden-crowned kinglet						
<i>Regulus satrapa</i>	1	...	...	...	...	...

\*The only positive cultures were obtained from a skunk which is described in the text.

walking repeatedly in a 4-ft. circle, had lesions suggestive of listeriosis but the organism was not found. Parts of the second skunk, which had been found dead, were heavily contaminated and *L. monocytogenes* was not isolated.

The third skunk was seen during the day in a sheep pasture and was oblivious of the approach of the sheepman. It was salivating and making chewing movements; a copious purulent exudate had accumulated around the eyes. This strange sight had attracted several sheep which stood in a 10-ft. circle around the skunk. The skunk was shot and promptly presented to us for study.

Gross lesions included general passive congestion, slight splenic enlargement, and a large friable liver. This animal was experiencing a disseminated *Listeria* infection. On primary culture, the organism was obtained from liver, bile (fig. 1), and intestinal contents. An impression of the numbers of organisms being shed from the liver into the lumen of the intestine may be obtained from the photograph which shows myriad *Listeria* colonies obtained from two drops of bile which were streaked out on the plate. On reculture, *L. monocytogenes* was found in the spleen, kidneys, and urine. The organism was not obtained from the brain, although histological ex-

amination disclosed evidence of a mild leptomeningitis which might have accounted for the neurological signs observed in the living animal. The brain was negative on a rabies examination made by the California State Department of Public Health.

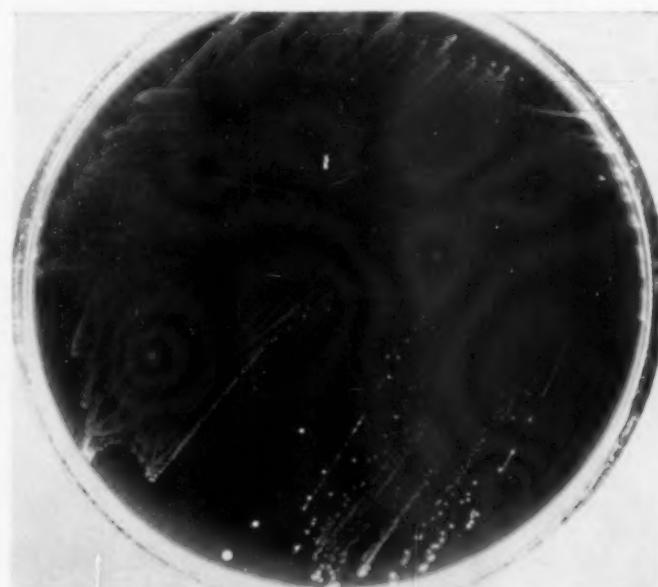
Cultures obtained from the sheep, the cow, and the skunk were typed serologically.<sup>10</sup> All belonged to serotype 4b. Homogeneity of serotype permits a common relationship among the various *Listeria* isolations made in this geographical area.

#### DISCUSSION

Reservoir status usually requires a well-balanced state of parasitism which permits prolonged survival of the parasite and an opportunity for it to escape and gain a new host. Animals with subclinical infections, from which the disease agent may escape, can act as reservoirs. In a previous paper,<sup>9</sup> it was postulated that the liver could be an important organ in the epizootiology of listeriosis among non-ruminant animals. Massive infection in that organ creates an escape route for great numbers of bacteria down the bile duct and, thus, out in the feces. In the ex-

<sup>9</sup>The authors are indebted to Dr. Heinz Seeliger, Hygiene Institute of Germany, Friedrich-Wilhelms-Universität, Bonn, Germany, for typing the *Listeria* strains.

Fig. 1—*Listeria monocytogenes* isolated from a naturally infected skunk by streaking out two drops of bile.



perimental model, the New Zealand white rabbit was observed to experience sub-clinical infection and to shed the organism freely. In addition, exposure of the digestive tracts of both sheep and rabbits resulted in disseminated infections, demonstrating the possible importance of ingestion as a portal of entry for the agent.<sup>7,9</sup>

Since the jack rabbit is a common wild species in the study area, several specimens were collected, and it is noteworthy that *L. monocytogenes* was not found in the 29 examined. There were no lesions suggestive of listeriosis. Likewise, the ground squirrels, which came under suspicion, and the mice, including those inhabiting fields and living around the sheep barns, presented no suggestive lesions nor did they yield the agent. Bird species, such as seagulls and buzzards, which were known to feed on the carcasses of animals which died of listeriosis, were also negative bacteriologically.

The authors would hesitate to say that the skunk and raccoon are finite hosts at the base of an infection chain. However, the evidence does indicate that this listeriosis epizootic was founded on a broader biological basis than simply a disease limited to sheep. The positive evidence of infection in the skunks and the observations on the raccoons may denote one of nature's secrets in which the sheep losses may have been merely a consequence of a more extensive and complex cycle of infection. The place of these species in listeriosis epizootiology is further strengthened by the recovery of *L. monocytogenes* from a skunk in North Dakota<sup>10</sup> and a raccoon in Connecticut.<sup>11</sup> Both of these laboratories encountered the Listeria isolations by chance. Animal collections during listeriosis epizootics may reveal that this is not an uncommon occurrence.

It is tempting to speculate that listeriosis in these wild animals may create circumstances for involving man and domestic animals in this disease, similar to the role of rats in plague. Plague infection in man is merely an occasional problem as long as the resistance of the rats is high. The rodents begin dying of plague when a combination of decreased resistance of the rats and certain other factors exist. This results in a situation by which man comes in contact with the organism. In this listeriosis epizootic, the skunks and raccoons were dying, and the infected

skunk obtained was experiencing an acute infection. While able to grossly contaminate pasture land with both its feces and urine, it could not maintain the agent over a prolonged period. It may be theorized that this skunk was highly susceptible and that its predecessors in that area, during the years just past, must have been more resistant if that species is to serve as a reservoir.

More work needs to be done to ascertain this point and to examine the place of other animals, such as rats, in this cycle. Since many cases of listeriosis in man occur without known animal contact, one wonders if rats and mice may serve as unknown sources of contamination. Little attention seems to have been focused on this question since the isolation of *L. monocytogenes* from a rat by Macchiavello in 1942.<sup>12</sup>

#### SUMMARY

1) A total of 107 specimens of wild mammals and birds were collected in an area undergoing an epizootic of listeriosis involving sheep on five ranches and one herd of cattle.

2) There was evidence of a population decline among raccoons and skunks preceding and during the time that the ruminants were affected.

3) *Listeria monocytogenes* was recovered from the liver, bile, intestinal contents, spleen, kidneys, and urine of a striped skunk (*Mephitis mephitis*).

4) The Listeria strains from the sheep on various ranches, the cow, and the skunk all belonged to serological type 4b.

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<sup>5</sup>Gifford, R., and Jungherr, E.: Listeriosis in Connecticut with Particular Reference to a Septicemic Case in a Wild Raccoon. *Cornell Vet.*, 37, (1947): 39-48.

<sup>6</sup>Macchiavello, A.: Estudo de Una Cepa de *Listeria Monocytogenes* Aislada de Rata. *Arquivos de Higiene*, 12, (1942): 105-108.

**Rocky Mountain Spotted Fever.**—Regardless of its name, this disease occurs in all parts of the United States and, of the 4,517 cases reported, nearly half (2,239) were in south Atlantic states and only 531 in eight Rocky Mountain states. The most important vectors are the wood tick (*Dermacentor andersoni*), found in the Rocky Mountain region and adjacent areas, and the dog tick (*Dermacentor variabilis*), found in the Great Plains and eastward to the Atlantic Coast. The first signs of the disease are a persistent fever and a cutaneous eruption.

Of 74 cases, at a Virginia hospital in a ten-year period, 31 were in patients under 12 years old, and 20 were in patients more than 50 years old. Five of the seven patients with fatal cases were more than 55 years of age, and one was a child. Several patients had no history of tick bites but most of these had removed ticks from dogs with their fingers. The use of antibiotics, particularly the tetracyclines and chloramphenicol, have improved the prognosis.—*J.A.M.A.* (March 23, 1957): 1,003.

**Antibiotics Can Interfere with Immunity.**—During an epidemic of septic sore throat, quick recoveries after antibiotic therapy in 12 cases were followed in six to ten days by a recurrence of the infection. Recovery is usually followed by a transient immunity for one to six months, but by destroying the organisms quickly they apparently were prevented from stimulating antibodies.—*Med. Times* (April, 1957): 380.

## Ecological Factors of the Geographic Distribution of *Coccidioides Immitis*\*

KEITH T. MADDY, D.V.M., M.P.H.

Phoenix, Arizona

The ecological requirements of various microorganisms affect the geographic distribution of certain infections of man and animals. Coccidioidomycosis, which is common in man and animals in southwestern United States, has been studied.

The author, using a coccidioidin skin test on home-raised cattle in various parts of the Southwest, particularly in Arizona, and studying the climate and plant and animal life of proved endemic areas, found that these areas are almost identical with the Lower Sonoran Life Zone.

In 1898, Merriam (and later others) divided the United States into various life zones according to the sums of temperature above a given temperature for the year, to which was added the mean temperature for the hottest six weeks. These temperature zones were subdivided into their humid and arid provinces. One of these zones was designated as the Lower Sonoran Life Zone (fig. 1).

A preliminary study revealed that this probably reflects the need of the fungus (*Coccidioides immitis*) for an arid or semi-arid climate, an alkaline soil, relative freedom from severe frosts, and a very hot season of several months followed by some rain. A mean temperature of 70 F. for the year, of 90 for July, and of 51 for January, and an annual rainfall of 5 to 15 inches seem to provide the most ideal climate. The parts of the Lower Sonoran Life Zone with a more arid or less arid climate, or with lower summer mean temperatures, are apparently less favorable areas for the fungus. The rainfall extremes can range from about 3 to 20 inches per year. A mean temperature as low as 60 F. for the year, 80 for July, and 39 for January are ap-

From the Communicable Disease Center, Public Health Service, U.S. Department of Health, Education, and Welfare, Atlanta, Ga.

\*A summary of a paper presented before the combined sections on Public Health and Research, Ninety-Third Annual Meeting, American Veterinary Medical Association, San Antonio, Texas, Oct. 13-18, 1956. This paper was also presented at the Symposium on Coccidioidomycosis on Feb. 12, 1957, at Phoenix, Ariz., and appears in the proceedings of this conference. The proceedings will be printed and released soon by the Communicable Disease Center, U.S. Department of Health, Education, and Welfare, Public Health Service, Washington, D. C.



Fig. 1.—The Lower Sonoran Life Zone of the United States (dark areas), where coccidioidomycosis is endemic.

parently characteristic of the minimum temperatures that permit this fungus to grow in nature. The measured rainfall is less important than the precipitation effectiveness as determined by evaporation, temperature, vapor pressure, and other factors such as the season at which the rainfall occurs. The type, kind, and amount of vegetation in an area is a good indicator of the precipitation effectiveness.

Although too preliminary to summarize, these observations indicate a number of ecological factors regarding the growth and propagation of *C. immitis*. In addition to man, many mammals in the areas eventually become infected, most likely by inhaling dust, the common source of the fungus. In most of these mammals, the fungus reaches a dead end.

Apparently, the dog develops disseminated infections more often than man. In a study of 100 cases of naturally-acquired, disseminated coccidioidomycosis in dogs, the author found that some of the severely infected animals had sputum and urine with high spherule counts. Some had draining lesions on the body surface with exudates with high spherule counts. When such exudate or urine is streaked on Sabouraud's medium or is put on sterile, moist soil, the mycelial form (the infective form) grows in a few days. Spherules of the fungus also are released in the feces

of severely infected dogs and sometimes the mycelial form grows on the surface of the stool in a few days. Some severely infected animals may be an indirect infection threat to other mammals but this does not appear to be a common mode of infection.

Although soil samples have been collected from numerous areas in Arizona, *C. immitis* has been isolated only in or around rodent holes in the desert. It is most frequently found a few weeks or months after rain.

It appears that *C. immitis* can grow only where there is a definite period of hot weather, during which there is little or no rainfall and during which the surface soil becomes somewhat sterilized. The fungus probably remains viable just below this layer of soil, as well as in the more moist and more nitrogen-rich environment of the desert rodent holes. When rain eventually falls, the humidity in the surface soil probably approaches the optimum for the fungus which grows well until other soil microorganisms interfere or until the soil dries. The fungus probably still grows for a while down in the earth cracks and holes until the humidity in these sites drops or other soil microorganisms interfere. At this time, the environment is most infective, with winds picking up and scattering dust and arthrospores.

## Surgery and Obstetrics and Problems of Breeding

### Testicular Teratoma and a Testicular Hematocyst in a Colt

RAYMOND D. ZINN; J. P. MITCHELL; W. F.  
GUARD, D.V.M.; ROBERT L. FARRELL, D.V.M., Ph.D.;  
A. B. WHITE, D.V.M.

Columbus and Grove City, Ohio

A Standardbred colt, 18 months old, was presented for castration in November, 1956. The owner believed that both testicles had been in the scrotum six months

Chairman, Department of Veterinary Surgery (Guard); assistant professor, Department of Veterinary Pathology (Farrell); senior veterinary students (Zinn and Mitchell), Ohio State University, Columbus; and practitioner, Grove City (White).

previously but when an attempt had been made to castrate the colt three months ago, neither testicle could be found in a two-hour search. Later, on rectal palpation, it was decided that this was an unusual type of cryptorchism.\*

Upon palpation at the time of operation, the left testicle was easily located just anteromedial to the normal position of the left internal inguinal ring. The testicle was grossly malformed, resembling an enlarged nodular ovary with multiple areas of increased density. The right testicle

\*The physical examination was done by Dr. A. B. White. Dr. W. F. Guard was the consultant and surgeon.

Fig. 1—Photographs of both cryptorchid testicles. A and B show the cystic nature of the left testicle with and without (B) the epididymis and serous covering. C and D are the right testicle, intact and opened (D) to show the hematocyst.



Ohio State University

could not be located *per rectum*, although an enlarged ductus deferens was palpated.

#### OPERATION

A proprietary mixture of chloral hydrate and magnesium sulfate was administered intravenously and the colt was placed in dorsal recumbency. Scars were visible over the scrotum from the previous attempt at castration.

The surgical field was prepared and draped. Since the left testicle had been palpated, it was removed first. The incision was made on the left side of the scrotum and, by means of alternate sharp and blunt dissection to overcome the scar tissue, the inguinal canal was invaded manually.

The peritoneum, covering the usual position of the internal inguinal ring, was punctured and two fingers were passed into the peritoneal cavity. By careful palpation, the gubernaculum testis and ductus deferens were grasped between the two fingers, pulled into the inguinal canal, and grasped with a pair of forceps. Tension was applied and, after enlarging the opening, the testicle was brought into the scrotum. An emasculator was applied high up on the cord and the testicle (fig. 1A, B) was removed.

Entrance into the inguinal canal and abdominal cavity on the right side was made with considerable difficulty, due to the increased cicatricial tissue. The enlarged ductus deferens and vessels were located, forceps attached, and the right testicular mass was delivered and removed in the same manner as the left. It proved to be an anomaly of a different nature, having the appearance of a flabby, pear-shaped piece of liver which contained fluid (fig. 1C, D).

Sterile packs were placed in the inguinal canals and single x-type linen sutures were inserted to anchor the packs and close the skin incisions. The animal recovered from the anesthesia sufficiently to get up in 20 minutes and was given 1,500 units of anti-tetanus serum. The patient was kept tied in the standing position for three days. The packs were removed after 48 hours and the tracts wiped with gauze impregnated with "BPP." Exercise was started on the second day and continued for ten days when the patient was moved to the owner's farm. No antibiotics or chemotherapeutic agents were used. The body tem-

perature did not exceed 101.5 F. postoperatively, and only slight edema of the sheath occurred. All drainage from the incisions had ceased by the tenth postoperative day.

#### PATHOLOGY REPORT

The left testicular mass was irregularly lobulated, yellowish tan, and measured 9.0 by 6.5 by 5.0 cm. The mass was cut with difficulty, due to the presence of spicules of bony material. The presence of haversian canals, seen microscopically, confirmed that this was true bone tissue. There were several firm, somewhat elastic enlargements at the periphery which were light tan and greasy when sectioned. These proved to be adipose tissue. Two cysts, with thick walls, were filled with yellowish, pasty material in which mats of fine, white hair were distributed. Microscopically, the material was keratinized epithelial detritus produced by stratified squamous epithelium lining the cysts. Adnexa of functioning sebaceous and sweat glands and hair follicles were seen in the subepithelial connective tissue.

Another cyst, near the center of the testicular mass, was lined with pseudostratified columnar epithelium containing goblet cells. The grossly recognizable testicular tissue at one end of the mass microscopically consisted of atrophic, degenerated seminiferous tubules between which were relatively large numbers of interstitial cells.

The right testicle was a flaccid, dark reddish brown mass which measured 8.0 by 5.5 by 4.0 cm. Longitudinal section revealed it to be composed of a fleshy portion and a hematocyst with a fibrous calcified wall. The testicular portion was necrotic.

*Preventing Parturient Paresis.*—When an attempt was made, at the University of Illinois, to prevent parturient paresis by feeding irradiated yeast or synthetic vitamin D to 48 cows, for three to seven days before calving, this was accomplished in only 48 per cent of the animals in spite of careful watching by experienced dairymen. Six of these cows (12.5%) developed the disease and 4 of these had been given the supplement three or more days. Of 39 control cows, only 3 (7.8%) were affected. The cost of treatment averaged about \$6 per cow.—*Prairie Farmer* (April 6, 1957): 22.

## Observations on the Use of Nicotine for Immobilizing Semiwild Goats

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SINCE THE turn of the century, both the biologist and wildlife conservationist have recognized the need for efficient and practical, but safe, methods of capturing and restraining wild animals.<sup>1,2</sup> The ancient poisoned arrow approach of the South American Indians has inspired considerable interest in this technique,<sup>3</sup> and various forms of "propulsive delivery" have been developed for administering an appropriate drug.<sup>4-7</sup>

In an effort to select a suitable drug for this purpose, the authors have conducted studies of many tranquilizing, soporific, and cataleptoid agents.<sup>8</sup> Nicotine, a dangerous alkaloid, hitherto avoided for therapeutic use,<sup>9,10</sup> was chosen for extensive trials. It is the purpose of this report to discuss the gross action of this drug and its salts on goats (*Capra hircus*).

### CHEMISTRY AND PHARMACOLOGICAL ACTION OF NICOTINE

The alkaloid, nicotine, is obtained from several species of tobacco (*Nicotiana* spp.). When purified, it is an odorless, clear liquid with a specific gravity of 1.009. Upon exposure to light or atmospheric oxygen, it darkens, assumes the characteristic odor of tobacco, and volatilizes at room temperature. This compound, 1-methyl-2-(3 pyridyl) pyrrolidine ( $C_{10}H_{16}N_2$ ), has a molecular weight of 162 and is miscible with water, soluble in most organic solvents, and capable of forming salts with most acids and double salts with some acids and many metals.<sup>11</sup>

Pharmacologically, nicotine has been considered a parasympathomimetic agent with curariformic activity. It produces a typical biphasic, fleeting stimulation preceding paralysis of all autonomic ganglia. Sympathetic stimulation may result from extremely small doses and, as dosage is increased, both divisions of the autonomic system may respond. With toxic quantities of nicotine, the cen-

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tral nervous system and myoneural junctions are involved, resulting in postural incoordination and paralysis.<sup>12</sup> The many physiological responses of nicotine become more complex when species and individual variation are considered, making it difficult to predict a specific reaction to nonlethal doses.

The average lethal oral dose of nicotine for man is considered to be in the vicinity of 50 mg.; severe convulsions have resulted from 5 mg. and recovery from the effects of 4 Gm. of pure nicotine has been reported.<sup>13</sup> The lethal dose for dogs is 10 mg. per kilogram of body weight orally or 3 mg. per kilogram intravenously.<sup>14</sup> The minimal effective dose to cause the pivot response or loss of motor function in the hindlegs of rats is 0.4 mg. per kilogram of body weight with the lethal dose reported as 35 mg. per kilogram of body weight. For rats, age has no effect in determining the degree of response to the drug but mice exhibit a decreased susceptibility with increase in age.<sup>15</sup>

The development of tolerance to nicotine has been a subject of controversy. Rats were shown to develop an acute tolerance to the second daily injection of convulsive doses of nicotine but regain their original threshold status within 24 hours. Rabbits (m.i.d.<sub>50</sub>, 10 mg./kg.) gave no evidence of tolerance developing or of chronic toxicity to daily injections with convulsive doses of 7 mg. per kilogram of body weight.<sup>16</sup>

### MATERIALS AND METHODS

The nicotine alkaloid and several of its salts (sulfate, tartrate, lactate, and salicylate) were used on semiwild goats of varying sizes and age groups. The drugs were delivered into the systemic circulation either with a syringe and needle or a gun\* and dart (fig. 1) designed for this specific purpose.

When given by syringe and needle, the alkaloid and its salts were diluted or put into solution with physiological saline (0.85% NaCl) at concentra-



Fig. 1—A gun and dart designed for the "propulsive delivery" of a drug.

\*The gun is a modification of the Crossman air-gun, Crossman Arms Co., Rochester, N. Y.

tions of 40 mg. per milliliter. The "drugged darts" were prepared by massing the salt with honey, forming a pliable material which would adhere to the shaft of the dart. Because of the hygroscopic nature of these salts, the "loaded darts" were kept in tubes of 12-mesh calcium chloride until no more than four hours before use. The time extremes for dehydration were from one to 30 days. The darts were propelled from distances of 10 to 30 yd.

The drugs, when injected, were given intraperitoneally, subcutaneously, or intramuscularly. Each subject was carefully observed during the course of physiological disturbances and was then watched for three to nine months for possible aftereffects.

#### RESULTS AND DISCUSSION

The immobilizing qualities of nicotine and its salts on goats are presented (table 1). The specific action of nicotine on these animals was observed (fig. 2-5) to be consistent as follows:

1) Usually, within 30 to 90 seconds after drug administration, the goats showed signs of apprehensiveness and excitement. Some remained standing and bleated incessantly, others bolted for 10 to 50 yd. and then fell, and a few simply lay down and appeared to "await paralysis."

2) Tonic and clonic contractions of the skeletal muscles often occurred during the excitatory phase, lasting from one to two minutes and rapidly progressing into varying degrees of catalepsy and paralysis of

the skeletal muscles. The duration of the latter conditions averaged approximately 30 minutes.

3) The only outward indication of effect on the smooth musculature was a tendency for the animal to micturate and defecate soon after the first appearance of clinical signs. During the periods of catalepsy some animals urinated intermittently for ten minutes.

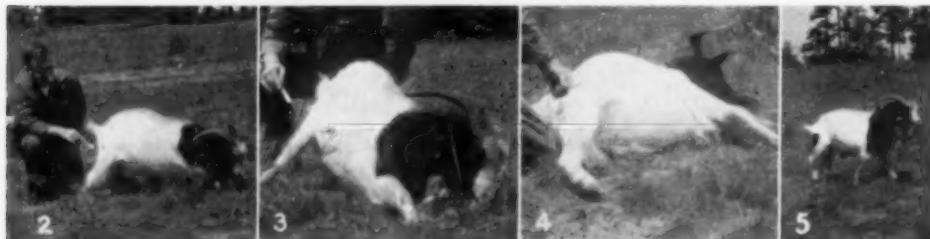
4) Throughout the excitatory phase, cardiac action was greatly accelerated, sometimes exceeding 200 beats per minute, followed by progressive slowing of the heart as the curariform phase assumed dominance. Large doses of nicotine (3 to 5 mg./lb.) produced an irregularity in heart action; however, recovery was rapid.

5) Respiratory efforts were somewhat labored during the entire course of nicotine action. With large doses (3 to 5 mg./lb.), irregular respirations, frequently with long pauses before inspiration, occurred. At no time, however, was cyanosis apparent and the animal soon returned to normal breathing.

6) The only gross evidence of effect on glandular activity was marked salivation. Some coughing and histamine action occurred but strangulation, pulmonary edema, or other serious complications were not observed.

TABLE I—Nicotine for Immobilizing Semiwild Goats

Form of drug used	No. of animals used	Administered by Syringe and Needle			Observations and comments on immobilization qualities
		Mg./lb. of body weight (drug range)	Average time (min.) for immobilization (at dose to produce apparent recovery)	Average time (min.) (at dose to produce immobilization)	
Nicotine alkaloid	28	0.14-3.0 mg.	2.8	28	Very active from 1.0 to 3.0 mg./lb. of body weight.
Nicotine sulfate	2	1.0-5.80 mg.	1.5	24	Activity comparable to that of the alkaloid.
Nicotine tartrate	1	2.0 mg.	none	none	Inactivity of single dose discouraged further investigation with this salt.
Nicotine salicylate	9	1.0-2.50 mg.	2.5	22	Activity slightly less than that of the alkaloid.
Administered by Propulsive Delivery					
Nicotine sulfate	6	1.70-3.85 mg.	2.7	20	Pronounced activity, however too hygroscopic for practical purposes.
Nicotine lactate	5	2.3-5.0 mg.	none	none	Little activity at relatively high doses.
Nicotine salicylate	49	0.95-4.55 mg.	3.8	28	Active from 1.73 to 4.55 mg./lb. of body weight. Excellent safety factor and the physical characteristics were ideal for use on darts. Apparently the nicotine salt of choice for these purposes.



Figures 2 to 5 were made of a 110-lb., semiwild male goat which, under normal circumstances, would not allow a person to come within a range of 20 yards. An attempt was made to show the effects of nicotine salicylate (300 mg.) on this animal, from the time of propulsive induction, until recovery was apparent.

Fig. 2—Two minutes after administration of nicotine salicylate. The animal was in excitement stage. Notice position of "hit."

Fig. 3—Four minutes after the goat was hit, it was in partial catalepsy with complete loss of locomotion.

Fig. 4—Five minutes after administration of the drug, the goat fell in a mild convulsion.

Fig. 5—Fifteen minutes after nicotine administration, the goat regained footing but was unable to run. The black spot on the right hindleg is the screwworm smear applied at the site of dart penetration.

7) The corneal reflex always persisted and no consistent effect on the iris was recorded.

8) Of the 36 goats used, with many subjected to repeated trials, there were no fatalities or apparent ill effects from the drug.

9) Where repeated "shots" were necessary, an acute tolerance to the drug (tachyphylaxis) seemed to exist; however, the original threshold was regained within 24 hours.

The classic biphasic action of nicotine, a transitory period of excitement followed by varying degrees of immobility and paralysis, was observed throughout these studies. The former lasted from one to two minutes and the latter from ten to 60 minutes. A cataleptoid phenomenon was observed to occur between the excitatory response to the drug and that which has been described as the curariform stage.

The effective dose of the alkaloid for safely immobilizing goats was found to range between 0.55 and 1.5 mg. per pound of body weight. At higher doses, a wide margin of safety was evident. The m.l.d.<sub>50</sub> of nicotine or its salts was not determined for goats. Nicotine sulfate and nicotine salicylate, the most effective salts, were found to possess only about one half the strength of the alkaloid. The salicylate was considered the best adaptable for propulsive delivery.

Nicotine salicylate, as received from the manufacturer, showed marked variations

in potency. Only the results obtained from the most active grade of this drug have been presented in this report. Because of the variation in potency, it was necessary to biologically assay each lot of nicotine salicylate, using the alkaloid as a standard.

Subcutaneous or intraperitoneal admin-



Fig. 6—A young buck deer in cataleptoid stage six minutes after the administration of 300 mg. of nicotine salicylate. The drug was delivered by dart gun technique.

istration greatly retarded or completely prevented the desired effects of the drug; therefore, the intramuscular route was preferred. The musculature of the hindquarters was always used.

After a period of observation of three to nine months, none of the experimental subjects showed gross evidence of permanent damage caused by the drug. Although some animals were completely immobilized as many as six times, they remained in excellent condition. Six females, which were immobilized twice during late gestation, gave birth to normal kids.

#### SUMMARY

A unique method of delivering a drug with a dart from a distance (10 to 30 yd.) into the circulatory system of an animal has been suggested.

The potentialities of nicotine and several of its salts for immobilizing semiwild goats have been studied and an estimate of the therapeutic index of each was established. Nicotine salicylate was chosen for use with a dart-gun technique primarily due to its physical characteristics.

#### COMMENTS

Nicotine salicylate, delivered by propulsion has been used to capture 14 wild and 3 penned deer (*Odocoileus virginianus*).<sup>7</sup> Since this report, 160 additional wild and 2 penned white-tailed deer have been captured with this method. Although mortality of this group was 8.9 per cent, it does not exceed that of many accepted trapping procedures. The effects of the drug on these animals was found to closely parallel those described for goats.

At present, these or similar methods with various drug combinations are being investigated for handling and capturing other species of larger domestic and wild animals.<sup>8</sup> Work is also being continued to improve the effectiveness and range of the instrument for delivery.

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*Impotency in Animals in Captivity.*—A tiger in a zoo, in Ceylon, showed no interest in his mate even though treated both orally and parenterally with many testicular hormone preparations. When given testosterone oenanthate (250 mg.) intramuscularly a week prior to the anticipated estrus of his mate, he responded, the service resulting in 3 cubs. Two weeks later, he served another tigress and sired another cub. A male jaguar with a similar history impregnated his mate 24 hours after a similar injection.—P. B. K. Pillai in Ceylon Vet. J. (June, 1956): 51.

*Possible Chemical Castration with Cadmium Salts.*—In 24 to 48 hours after subcutaneous injection of a solution of cadmium chloride into 300-Gm. rats, the testicular tissue was damaged, ending in complete necrosis. Only slight changes occurred in other organs, and ovaries of female rats were not affected.—Nature, 177, (1956): 1036.

## Hypertrophic Osteodystrophy Associated with Disturbance of Vitamin C Synthesis in Dogs

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DURING THE past few years, a skeletal disease (hypertrophic osteodystrophy) peculiar to growing dogs has been studied at the Angell Memorial Animal Hospital. The data were gathered from 7 dogs that were either hospitalized, subjected to x-ray consultation, or submitted for necropsy. A similar or identical condition is known to have been observed in various parts of the world—the Royal (Dick) School of Veterinary Studies, Edinburgh, Scotland<sup>6</sup>; Ontario Veterinary College, Guelph<sup>2</sup>; South African Veterinary College, Ondersteenberg<sup>12</sup>—and to have been reported earlier.<sup>3,7,9,10,13,14</sup>

The term "hypertrophic osteodystrophy" describes the lesion grossly, histologically, and radiographically. The earliest lesions appear at the distal metaphyses of the long bones (radius, ulna, tibia). The ribs, mandible, and proximal metaphyses of the long bones may also be involved. Grossly visible swellings appear first in the vicinity of the distal metaphyses and are due to fibrous thickening of the periosteum and to extra-periosteal new bone formation of a primary (fibrillary) type. The swellings are warm and may be painful.

Radiography in the early stages of the disease shows lesions comparable to clinical rickets with later formation of extra-periosteal new bone. Extension of the lesion along the shaft of the long bones eliminates rickets as a diagnosis radiographically; in addition, calcium, phosphorus, and alkaline phosphatase tests show normal values. Low vitamin C levels of the plasma suggest hypovitaminosis C as a factor in producing this syndrome.

The dogs involved were 2 Great Danes, 1 Irish Wolfhound, 1 Boxer, 1 Labrador

Acting pathologist (Meier), resident in pathology (Clark), chief of staff (Schnelle), Angell Memorial Animal Hospital, Boston, Mass.; former intern at Angell Memorial Animal Hospital, now with the Department of Physiology, Colorado State University, Fort Collins (Will).

The authors thank Dr. Jonathan Cohen, Children's Hospital, Boston, Mass., and the entire group of workers in the endocrine department at Massachusetts Memorial Hospital, Boston, for their efforts and assistance. Dr. Cohen prepared some of the microscopic slides and the gross specimen.



Fig. 1—Male Shepherd-type dog, 5 months old, showing severe bilateral enlargements of distal metaphyses of radius and ulna, and back arched from extreme pain (during febrile stages).

Retriever, 1 Doberman Pinscher, and 1 Terrier-type dog—all between the ages of 4 and 8 months.

### CLINICAL FINDINGS

All of the affected dogs showed lameness which was attributed to acute rickets. Dis-



Fig. 2—The same dog shown in figure 1—notice splayed feet and severe swellings of distal radius and ulna.



Fig. 3—Male Boxer, 10 months old, showing postlike limbs and residual metaphyseal enlargement of distal radius and ulna. The extraperiosteal bone is almost completely resorbed. The course of illness was six months. Hindleg distortion is, in part, due to recent pelvic and femoral fractures.

tortion of the limbs by swelling, definitely distinct from rickets, was not evident until the age of 4 months (fig. 1). All dogs seemed essentially normal except for the skeletal lesions.

During the period of observation, some mild, distemper-like symptoms appeared in some of the dogs. In one, a transient diarrhea appeared and, in another, a vesicular dermatitis was seen in the inguinal region. The relationship to distemper or kennel cough could not be proved however.

Most of the dogs were "cow-hocked" and developed splayed forefeet (fig. 2). The distal ends of the radius and tibiae were thickened, sensitive, and warm to touch; walking was obviously painful. The size of the swellings varied, acute enlargements (fig. 3) being associated with the presence of fever and reluctance to walk. In fever-



Fig. 4—Radiograph of the right foreleg of a dog, 3 months old, showing early hypertrophic osteodystrophy with features of clinical rickets: (A) dense zone due to crushing, (B) mushrooming, (C) zone of decreased density, and (D) periosteal haziness due to subperiosteal bleeding.

Fig. 5—Radiograph showing advanced hypertrophic osteodystrophy in the radius and ulna of a 6-month-old dog; (A) zone of increased density, (B) zone of decreased density, (C) extraperiosteal new bone, hemorrhage, and dystrophic calcification, and (D) distinct epiphyseal border.

free intervals, there was a decrease of lameness and no increase in the size of the swellings. Acute swellings coincided with profuse subperiosteal hemorrhage, possibly induced by incidental trauma. However, neither cage rest nor splinting prevented swelling from occurring. The fever may have resulted from protein resorption following hemorrhage. Aspirin regularly reduced the fever but not the lameness. Antibiotics were of no benefit.

The general condition of the animals varied from good to poor, although slight anemia with paleness of the mucous membranes was seen.

#### RADIOGRAPHY

The skeleton, as a whole, revealed normal bone development. Rarefaction in the meta-

physeal zone was followed by increased radiopacity in the same area (fig. 4). Metaphyseal lipping and subperiosteal radiopacity appeared next. Extraperiosteal bone deposition (fig. 5), probably secondary to local hemorrhage and dystrophic calcification, appeared in the next stage. The epiphyses were normal. As the condition progressed, the rarefied zone broadened and a degree of extraperiosteal bone formation eventually formed a collar of cancellous new bone around the metaphyses. This new bone extended along the shaft for a distance of almost half the length of the diaphysis and also extended onto the epiphysis in some of the more severely affected animals. The proximal ends of the bones were involved to a lesser



Fig. 6—Extraperiosteal new bone (ulna) in resorption (A) as a result of healing when the dog was 10 months old.

Fig. 7—Almost complete resorption of extraperiosteal new bone (A) (ulna) in an 11-month-old dog.

degree. Extraperiosteal new bone was formed on the mandibular rami in 3 dogs. During resolution of the osteodystrophy, the new bone was resorbed (fig. 6) and the metaphyseal compact bone returned to normal, or nearly normal, thickness (fig. 7).

#### LABORATORY FINDINGS

Routine laboratory studies were performed on hospitalized dogs. Except during the recurrent fever when there was albuminuria, the urinalyses were normal. One dog (Irish Wolfhound) was reported to have excreted a milky urine thought to be calcinuria, since large doses of cod liver oil had been given. Some of the animals had a slight anemia which was of a normochromic, normocytic type. Leukocytosis, with shift to the left, occurred during the febrile stage. Normal levels of calcium, phosphorus, and alkaline phosphatase existed, except when the calcium-phosphorus ratio was altered by unsuccessful attempts at therapy for rickets. The total serum protein level was slightly decreased in 1 of the emaciated animals. The vitamin A serum concentration was normal in 1 animal. The serum vitamin C content remained less than 0.1 mg./100 ml. of serum (normal 0.8 to 2.0 mg./100 ml.). This level could be increased insignificantly and temporarily by giving large doses of vitamin C (100 to 200 mg. per day), the intramuscular route being slightly more successful than the oral. No obvious clinical improvement resulted, however. The vitamin C level was determined repeatedly during the recovery of 2 animals, and the concentration rose spontaneously and corresponded with healing, both clinically and

radiographically. When healing was nearly complete, the vitamin C level fell within normal range.

#### GROSS PATHOLOGY

Necropsy material was collected from 5 animals which were euthanized at various stages of the disease.

The ends of all long bones were markedly thickened by hyperplasia and hypertrophy of the periosteum and extraperiosteal new bone formation. Lesions were most marked at the distal ends of the radius and ulna. Cross sections in the region of the metaphyses revealed a thickened, fibrous, or gelatinous (myxomatous) periosteum containing new bone, cartilage, and irregular areas of calcification, or both. The new bone formed a well-defined collar around the metaphyseal region. The compact bone in the region of the metaphysis was thin and incompletely developed, and a well-defined marrow cavity was lacking. In advanced cases, there was greatly thickened periosteum and extension of the extraperiosteal new bone to the midshaft. The shaft itself appeared normal. The extent of periosteal new bone was demonstrated in a dried bone specimen in which all organic material was removed (Soxlet method) (fig. 8). The weight of the bone indicated that the bone salt content was normal; however, exact chemical calcium determinations were not performed.

#### HISTOLOGY

The periosteum was greatly thickened by young fibrous tissue (fig. 9). The great fibroblastic activity in some areas resembled that in a sarcoma. Other areas ap-



Fig. 8—Gross specimen (radius), with the organic material removed, showing extraperiosteal new bone formation at metaphyseal sites.

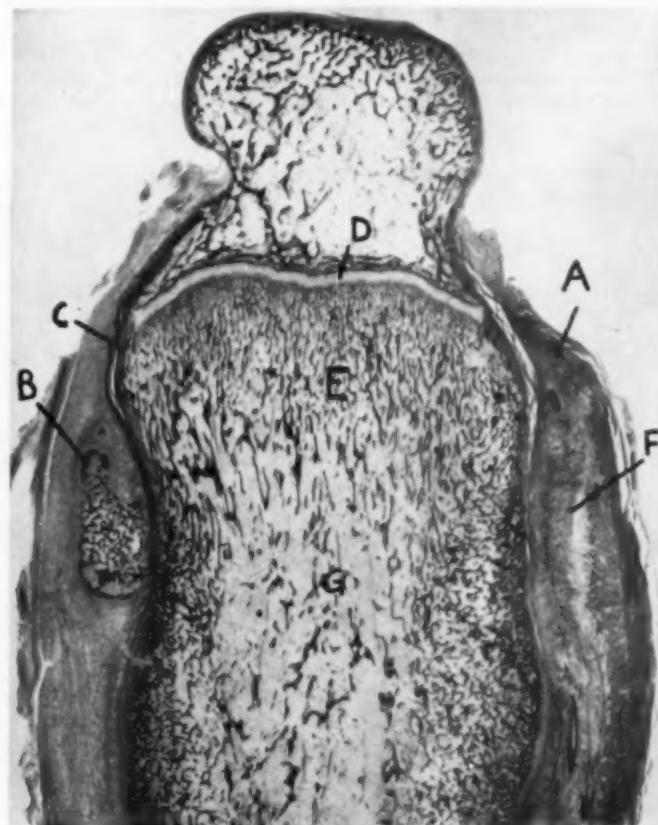
peared sclerosed and myxomatous. There was vascular hypertrophy as in granulation tissue. Small and extensive hemorrhages and necrosis, followed by dystrophic calcification, had occurred extraperiosteally (fig. 10). A transition of the connective tissue to cartilage and bone gave evidence of endochondral ossification. New bone was also formed without a cartilaginous interphase. Bony spicules occurred all around the metaphyses (fig. 11). The epiphyseal line revealed, in some portions, a failure of the cartilage cells to disappear; they were seen surrounded by inorganic calcium deposits and osteoid tissue (fig. 12). Osteoclastic activity and acute cellular reactions occurred at sites of recent hemorrhages (fig. 13). The trabeculae of the metaphyses were sparse and thin, with a narrow zone of osteoid tissue. The metaphyses lacked a well-marked outer layer of compact bone,

and a definite marrow cavity was absent. Hematopoietic tissue was present in the diaphysis only. The radiographically dense and flattened area contained collapsed trabeculae. This area, as well as the rarefied zone, showed hemorrhages, calcium deposition, trabecular fractures, acute cellular infiltrations, and scarring. The mushroom effect, and lipping, were caused by breakdown of metaphyseal compact bone due to hemorrhages and osteoclastic activity. Cellular infiltration and foreign body-type giant cells were thought to be reactions to the hemorrhages. The primary fibrillary extraperiosteal bone underwent resorption and was not replaced by lamellar bone in the metaphyseal compact bone.

#### DIFFERENTIAL DIAGNOSIS

A number of musculoskeletal disorders produce identical or similar changes, symp-

Fig. 9—Sagittal section of distal radius revealing (A) thickened periosteum, (B) ossifying activity, (C) thinning of metaphyseal cortex, (D) normal-appearing epiphyseal line, (E) metaphysis, (F) periosteal dystrophic calcification following extraperiosteal hemorrhages, and (G) lack of a well-defined marrow cavity. H & E stain;  $\times 4$ .



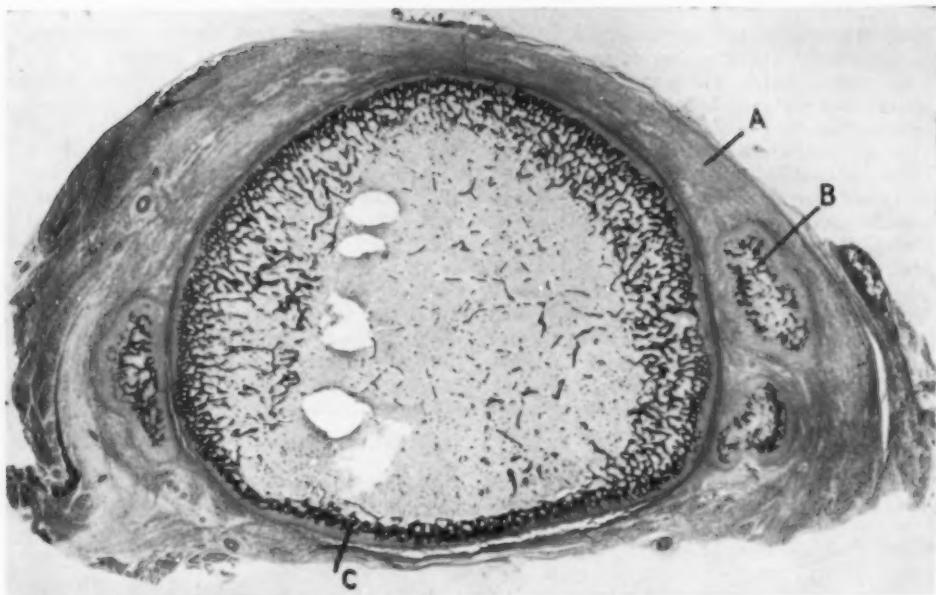


Fig. 10—Metaphysis exhibiting (A) periosteal hypertrophy and hyperplasia, (B) small hemorrhages and fibrosis, and (C) extraperiosteal dystrophic calcification from previous hemorrhages and necrosis.

H & E stain;  $\times 112$ .

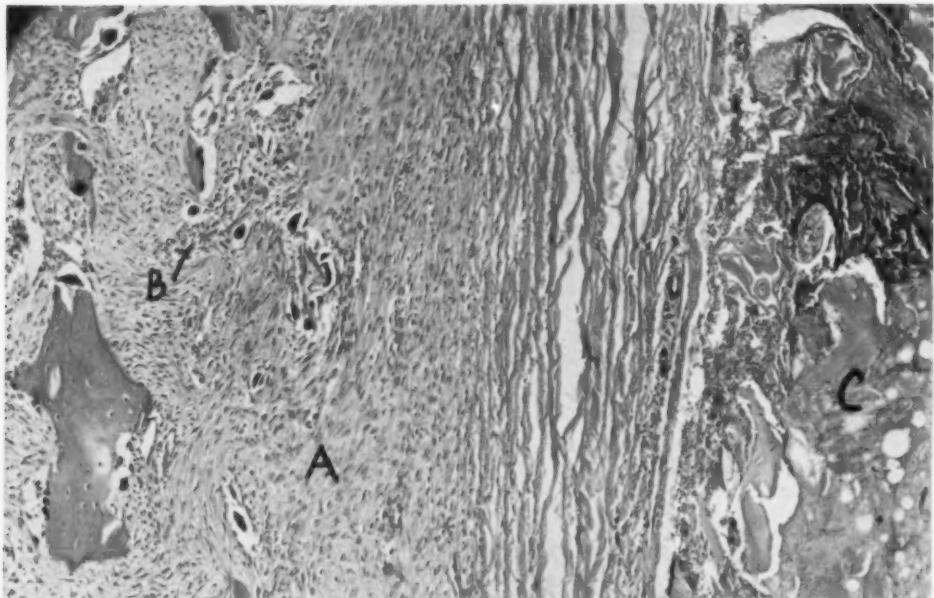


Fig. 11—Cross section through a metaphysis showing (A) hypertrophic periosteum, (B) centers of extraperiosteal ossification, and (C) cortical thinning. H & E stain;  $\times 5$ .

toms, clinical appearances, and even radiographic findings.

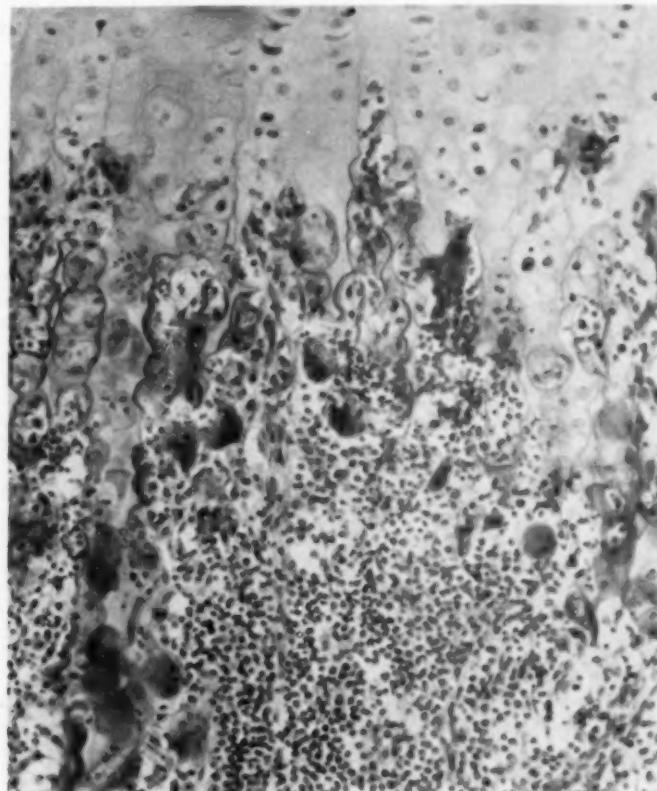
1) *Moeller-Barlow's Disease*.—This disease (also called infantile scurvy)<sup>1</sup> occurs in children. The radiographs are virtually identical to the condition described here, but vitamin C therapy immediately reverses the pathological process, with complete recovery. Usually, a fever is absent and the gross lesions are less severe, in part due to early diagnosis and treatment and less mobility of the patient.

2) *Rickets*.—The radiographic appearance of experimental and clinical rickets differs considerably in the dog,<sup>10</sup> clinical rickets being similar to scurvy in children. It appears, therefore, that rickets in the dog might be interrelated with other factors contributing to vitamin D deficiency. In experimental rickets, pain is unusual, although it is, at times, quite severe in both clinical rickets and in hypertrophic osteodystrophy.

Despite differences between the clinical and experimental types of rickets with regard to radiographic appearance and chemical blood findings, both types respond to vitamin D or calcium treatment, or both. Hypertrophic osteodystrophy, although initially similar to acute rickets radiographically, does not respond. This treatment appears to even worsen the condition.

3) *Hypertrophic Osteoarthropathy*.—This is a disease associated with subperiosteal and endosteal bone deposition of the limbs.<sup>11</sup> In man, the presence of clubbed fingers and toes is of great diagnostic importance. In animals, such alterations are not constant. The radiographic appearance is distinct from hypertrophic osteodystrophy. In the former, the bone growth from the outset is subperiosteal and cyclic and extends along the whole length of the shaft. The condition is usually secondary to cardiac or chronic respiratory lesions which, in some way, interfere with circu-

Fig. 12—Acute cellular reaction at the epiphyseal line showing polymorphonuclear and round cells interfering with normal sequence of cartilage cell development; failure of the chondrocytes to die is delaying their replacement by osteocytes. H & E stain; x 30.



lation and oxygenation of tissues, or both.

4) *Hypervitaminosis D*.—Associated metastatic calcification occurs throughout soft tissue, particularly in the lungs and kidneys.<sup>1</sup> This was not seen radiographically or histologically in any of the cases described, despite treatment with vitamin D and calcium.<sup>11</sup>

5) *Endocrine Disorders of von Recklinghausen's Disease and Others*.—Generalized osteoclastic osteoporosis, metastatic calcification, and abnormalities of endocrines, especially hyperparathyroidism,<sup>4,10</sup> differentiate the above conditions from hypertrophic osteodystrophy. The histological examination of all endocrine organs revealed normal findings.

6) *Infantile Cortical Hyperostosis*.—Hypertrophic osteodystrophy was thought by one of us (G.B.S.) to be infantile cortical hyperostosis. This diagnosis was based upon some radiographic similarity between the two diseases. The cause of infantile cortical hyperostosis in children is not surely known.<sup>5</sup> Differentiation is based on

histological findings. Both conditions tend to improve spontaneously.

#### DISCUSSION

Clinically and radiographically, the earliest manifestations in hypertrophic osteodystrophy are similar to, or identical with, clinical rickets; the South African cases have been described as rickets. The course in hypertrophic osteodystrophy, in contrast to rickets, shows severe recurring lameness with marked deformity and thickening of the long bones in the general region of the metaphyses. This type of involvement of the mandibular rami and maxilla of the jaw also is not seen in rickets.

Various treatments, including calcium preparations, vitamin D, multivitamins, steroids, salicylates, antihistamines, parathormone, calcium and phosphorus, and antibiotics, during episodes of fever did not produce improvement and, in some cases, seemed to cause deterioration of the condition. The diet did not seem to be relevant,<sup>8</sup> although, in some instances, there

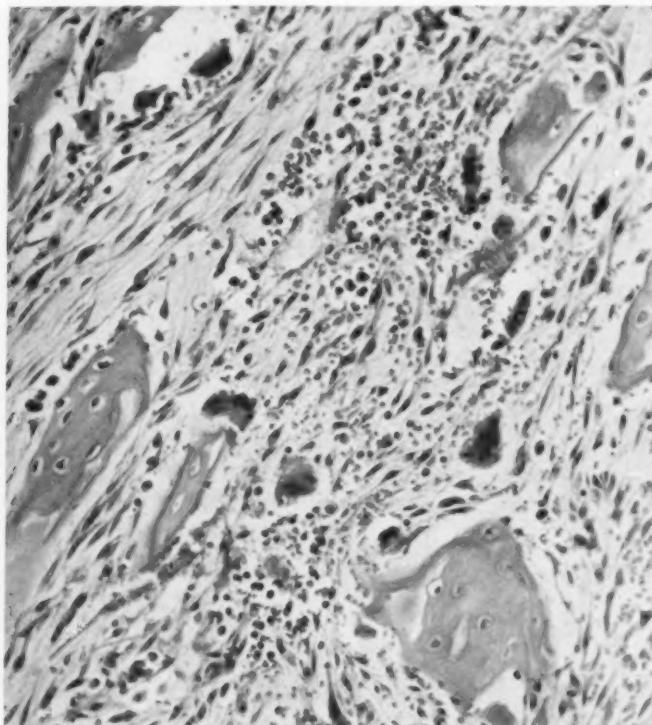


Fig. 13—Area showing small hemorrhage, beginning reactive fibrosis, and giant cells of osteoclastic and foreign body type.  
H & E stain; x 300.

was an overliberal supply of vitamin and mineral supplements. Parasite infections were not significant.

The radiographic evidence supports hypovitaminosis C. This view was enhanced by serum vitamin C determinations, the ascorbic acid concentrations being repeatedly less than 0.1 mg. in 2 cases. (In performing determinations of vitamin C, it is necessary to prevent oxidation and also to know that the C level does not always reflect the true concentration in the body. Furthermore, the ascorbic acid tends to accumulate in the buffy coat when the sample is centrifuged.)<sup>15,18</sup> It is hypothesized that since the ascorbic acid levels did not persist, the vitamin C given was destroyed, excreted, or utilized more rapidly than normal. Although vitamin C therapy was futile, spontaneous improvement appeared to take place when growth ceased. Complete disappearance of the lesions occurred in the South African cases reported as rickets. This observation would indicate a transient dysfunction of the vitamin C metabolism, possibly of vitamin C synthesis. At the time that the lesion was no longer active, the vitamin C level was normal.

Three of the dogs seen by us have recovered in that the lesion is no longer painful, although it is somewhat deforming.

#### SUMMARY

Seven cases of hypertrophic osteodystrophy in dogs, associated with failure of vitamin C utilization, are described.

The condition has apparently been observed in various parts of the world.

The disease occurs in growing dogs, 4 to 8 months old, which suffer from painful swellings in the metaphyses of the long bones (principally radius, ulna, and tibia), the costochondral junctions and, sometimes, the jaws. It results from severe periosteal hyperplasia, calcification, and heterologous osteogenesis.

Early radiographic findings include features of both clinical rickets and scurvy. Antirachitic treatment is not successful. Blood serum vitamin C levels are as low as 0.1 mg./100 ml. or lower, against a normal of 0.8 to 2.0 mg.

The clinical course continues for several months and is characterized by fever concomitant with diffuse swellings at the distal ends of the long bones.

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*Miyagawanella Bovis Infection in Calves*.—A virus of the psittacosis-lymphogranuloma group, which produces diarrhea and occasionally death in newborn calves, has been isolated from the feces of calves in New York, Indiana, California, and Montana. Colostrum from immune mothers prevented illness. The virus is not infective for young dogs, cats, or swine.—*York and Baker in Ann. New York Acad. Sci.*, 66, (1956): 210-214.

*An Enzootic Diarrhea in Calves*.—A viral agent was found responsible for a pneumonia-enteritis in calves 1 to 3 days old, in Wisconsin. Calves more than 48 hours

old, when exposed, usually recovered. The agent was found in lung tissues of normal calves and adult cows, indicating that healthy cattle are carriers and that transmission is through the air. Colostrum contains the protective substance.—*Brendly and McClurkin, in Ann. New York Acad. Sci., 66, (1956): 181-185.*

*Clostridia in Diarrheal Diseases.*—*Clostridium perfringens*, the only known species of Clostridium implicated in diarrheal diseases, can be divided into six types. Type A is responsible for gas gangrene in animals and has caused enterotoxemia in young suckling calves; type B is responsible for lamb dysentery, highly fatal the first four days of life; type C produces an acute hemorrhagic enteritis in young calves and lambs; type D causes enterotoxemia in sheep and goats but must be activated by proteolytic enzymes; type E has been isolated from a calf with acute enterotoxemia; and type F also produces toxins.

Protection against type C enterotoxemia in cattle can be produced by whole culture toxoid vaccines given to cows between three and six months of pregnancy. Ovine type D enterotoxemia can be controlled with specific toxoid or antitoxins.—*Baldwin and Griner in Ann. New York Acad. Sci., 66, (1956): 168-175.*

*Bacterial Diarrhea in Calves.*—*Escherichia coli* is believed to be a primary etiological agent in calf scours because (1) it has been isolated from calves with fatal cases more times than any other organism; (2) the disease has been reproduced in susceptible calves under controlled conditions by feeding a pathogenic strain in the first milk consumed after birth; and (3) bacteriostatic agents given at birth protected against the disease.—*H. W. Dunne in Ann. New York Acad. Sci., 66 (1956): 129-135.*

*Viral Diarrheas in Pigs.*—Transmissible gastroenteritis is the only primary diarrheal disease of newborn swine known to be caused by a virus. The mortality is extremely high in young pigs and decreases with age. Serum and gamma globulin from repeatedly exposed swine have no protective value. The virus has remained virulent for 18 months at -18 C. but is quickly killed by heat or chemicals. Infected intestinal tissues were nonvirulent after ten days at room temperatures. Swine are the

only species susceptible and attempts to propagate the virus in other species have failed.—*L. M. Hutchings in Ann. New York Acad. Sci., 66, (1956): 186-190.*

### Anti-Rabies Serum Interferes with Efficacy of Rabies Vaccine

Recent investigations indicate that in man the antibody response to phenolized vaccine was: (1) less with three doses at five-day intervals than with 14 daily doses; (2) one or two doses of serum almost completely suppressed antibody response to the three dose-routine; and (3) one dose of serum reduced, and two doses of serum 5 days apart suppressed, the antibody response to 15 daily doses. With three doses of high egg passage (HEP, 187 to 210 passage) Flury vaccine given five days apart, there was little antibody response when given intradermally but the inoculated individuals responded promptly to a later booster dose of the same vaccine; however, one or two doses of serum completely suppressed the antibody response and there was no response to a later booster dose.

It is, therefore, recommended that severely exposed individuals be given a single dose of serum followed by 14 or more doses of vaccine.

Recent studies also indicate that pups less than 3 months old are usually incapable of responding to any rabies vaccine and occasionally will succumb even to the low egg passage (LEP, 40 to 50 passage) Flury strain of vaccine. These vaccines protect adult cats but the nervous tissue vaccines protect to a significantly greater extent than the Flury vaccines. Kittens may also be protected but occasionally one less than 4 months old will succumb even to LEP Flury vaccine. The LEP Flury vaccine which is safely used in adult dogs has been shown to be hazardous to adult foxes, skunks, and cattle.

Dogs and cats bitten by a rabid animal should be immediately destroyed. If not, they should be isolated for six months and if not considered protected by vaccination they may be given serum (0.5 ml./kg.) followed by one to three doses of chicken embryo vaccine in seven days, or 14 daily doses of nervous tissue vaccine. If considered protected by vaccination, they should be revaccinated and isolated for 30 days.—*WHO Tech. Rep. Series No. 121, Expert Committee on Rabies, Third Report, Geneva (1957): 12.*

## What Is Your Diagnosis?

Because of the interest in veterinary radiology, a case history and radiographs depicting a diagnostic problem are usually published in each issue of the JOURNAL.

**Make your diagnosis from the picture below—then turn the page ▶**



Figure 1



Figure 2

**History.**—A well-nourished and well-developed male Dane, 7 months old, showed extreme sensitiveness of all four legs, both to bearing weight and to palpation. He would stand if lifted to his feet, but would slump on his sternum if urged to move any distance. A large, nonmovable, hard swelling was present on the lateral side of each leg. On the forelegs, the swellings were proximal to the carpal joint, and on the hindlegs they were proximal to the hocks. The swellings had enlarged rapidly since they were first noticed, when the pup was 4 months old. For two weeks previous to the examination, the dog had eaten sparingly and its temperature had ranged from 104 to 107 F. A photograph (fig. 1) and a radiograph (fig. 2) were taken of the front legs.

*(Diagnosis and findings are reported on next page)*

## Here Is the Diagnosis

(Continued from preceding page)

*Diagnosis.*—Hypertrophic osteodystrophy in a dog, probably associated with a disturbance of vitamin C synthesis.

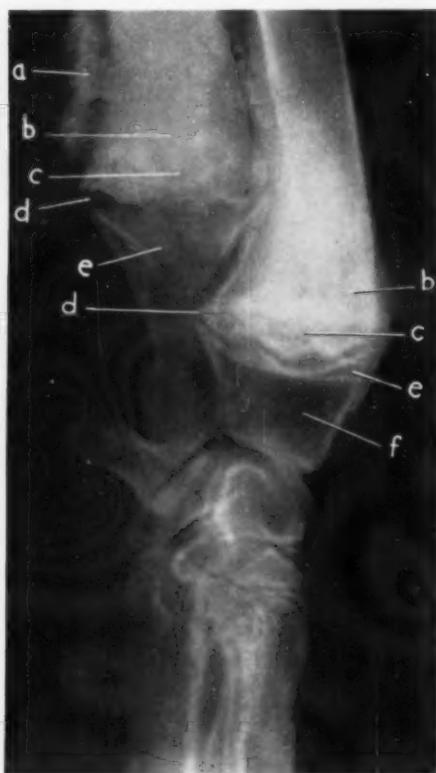


Fig. 3—The radiographic features of this disease are extraperiosteal bone deposition (a); increased osteal radiopacity (b); zones of rarefaction (c); metaphyseal lipping (d); normal appearing epiphyseal lines (e); and normal appearing epiphyses (f).

*Comments.*—This entity has long been recognized and usually has been referred to as inflammatory rickets. However, when treated with vitamin D, the condition did not improve rapidly; poisoning due to an excess of vitamin D was often suspected. It has also been suggested that the condition could be infantile cortical hyperostosis. (See "Hypertrophic Osteodystrophy Associated with Disturbance of Vitamin C Synthesis in Dogs," p. 483.)

This case was presented by members of the staff of the Riser Animal Hospital, Skokie, Ill.

## Observations on the Use of Sodium Silicofluoride in Feed for the Removal of Whipworms from Swine

E. E. CLORE, D.V.M., and TONY WILLE, Jr., D.V.M.

*Greenwood, Indiana, and Monmouth, Illinois*

IN 1951, in order to avoid infringement on certain patent rights related to the use of sodium fluoride, it became necessary to seek another agent, to be incorporated in the feed, for the removal of large roundworms from swine. A compound of a similar nature, sodium silicofluoride (sodium fluosilicate), was selected to be tested for effectiveness against ascarids and its toxicity for swine.

Six littermate pigs, 4 months old and averaging only 24 lb., were obtained. They presented the typical rough, unthrifty appearance associated with heavily parasitized animals. After the transaction was completed, it was learned that the pigs had been treated with a commercial product containing sodium fluoride. However, because of their unthrifty appearance and the desirability of using weak pigs for toxicity and palatability studies, it was decided to use them. Neither necropsies nor worm egg counts were done on any of these pigs before the trial began.

The 6 pigs were each given one feeding of sodium silicofluoride as 1 per cent of a complete commercial feed. Two days later, 1 pig was killed for examination. There were no roundworms in the small intestine, although the liver showed numerous small, white scars indicating that roundworms had been present at some time. In the cecum and adjacent portion of the colon, there were several hundred whipworms with their anterior portions still deeply imbedded in the intestinal mucosa. Many of them appeared to be lifeless.

The 5 remaining pigs were placed on a 21 per cent protein pig starter as the entire ration and, during the next 13 days, they almost doubled their weight, gaining 1.61 lb. per day (21 lb. each) with 1 lb. of gain for 1.85 lb. of feed.

A second pig, necropsied 14 days after the first, contained no roundworms and the few whipworms still present in the cecum were dead, either loosely attached to the mucosa or free in the lumen. A number of

dead whipworms were mixed with the content throughout the colon but none were attached. It is thought that the type of attachment of whipworms to the mucosa and the sacculated nature of the cecum accounted for their slow passage.

The toxicity and palatability of sodium silicofluoride were similar to sodium fluoride in the same concentration (1%). Subsequent, more precise tests also indicated that the former was at least as effective as the latter against ascarid infections.

Palatability studies indicated that the most successful ration consisted of 79 per cent of a palatable complete feed, 1 per cent sodium silicofluoride, and 20 per cent brown sugar but that a period of predosage starvation was essential. The 1 per cent sodium silicofluoride mixture tastes bitter to man and the bitterness persists for several hours.

Practical field trials over more than two years indicate the advisability of the following instructions.

- 1) Mix the ration thoroughly with a mechanical mixer; mixing with a shovel is not reliable and some poisoning may result.
- 2) Withhold all feed for 24 hours before treatment.
- 3) Supply water at all times.
- 4) Feed the sodium silicofluoride mixture dry. Wetting it will cause vomiting in most swine.
- 5) For best consumption results, separate the pigs into groups of equal body weight and feed the mixture in long troughs so all animals may eat at the same time without crowding. If the smaller pigs are fought from the trough, feed consumption will be inadequate in the animals that need it most.
- 6) As soon as the sodium silicofluoride mixture has been eaten, return the pig to the regular feeding program. No laxative is required.

Pigs being treated for worms for the first time should, preferably, be weaned and eating well.

Following the field trials, commercial use of the sodium silicofluoride mixture was

From the Hoosier Mineral Feed Company, Greenwood, Ind.

begun by more than 100 small feed manufacturers in all sections of the Midwest. During this time, necropsies on hundreds of unthrifty pigs have shown whipworms in all but 2, suggesting an incidence of infection of 99 per cent plus in unthrifty pigs of this area. Figures on percentage of infection in thrifty swine are not available.

One large drove in Illinois which had been twice treated for worms, once with sodium fluoride, still had many unthrifty hogs a month after the second treatment. They were treated with sodium silicofluoride after a necropsy revealed a few immature ascarids and a large number of whipworms. Three weeks later, they had improved so much that the owner would not allow another to be killed to determine the effectiveness of the treatment.

In Indiana, several weeks after a commercial sodium fluoride mixture had been used in a herd, losses continued and necropsies showed a heavy whipworm infection but no other disease. Sodium silicofluoride treatment was used with the warning that some of the weaker pigs might not survive the treatment. One pig did die, although it is not known whether death was the result of toxicity. The remaining pigs improved rapidly after treatment with no change in the feed or management. Similar results have been encountered in Missouri, Iowa, Minnesota, Ohio, and Kentucky.

Since the advent of the cadmium and the piperazine compounds, there have been several opportunities of following each type of treatment in 30 to 60 days with a dose of sodium silicofluoride because of continued unthriftiness in some of the pigs. In most instances, necropsies done before sodium silicofluoride treatment revealed a low roundworm population and heavy whipworm infections. Almost immediate improvement followed the use of sodium silicofluoride in these herds.

Many of the feed manufacturers mentioned reported an almost unanimous switch to piperazine when it first became available, because of the ease of administration, but that during the past year, there has been a definite trend back to sodium silicofluoride by swine feeders who were familiar with its effectiveness before piperazine appeared.

We have examined several pigs, dying or dead from other causes, which had been

treated with sodium silicofluoride under farm conditions and have always found the whipworm population to be nil or only slight.

While many do not consider whipworms a serious threat to the health of swine, these experiences and others indicate their almost constant presence in unthrifty hogs that showed no other evidence of disease. The U.S.D.A.<sup>1</sup> has long recognized that the swine whipworm may be costly to the swine producer.

The dosage rate for the 1 per cent sodium silicofluoride ration is 2 lb. for the first 50 lb. of body weight and 1 lb. additional for each 50 lb. of body weight thereafter, to a maximum of 5 lb. to any animal weighing 200 lb. or more. The dose for pigs weighing less than 50 lb. is calculated on the basis of 1 lb. for each 25 lb. of pig.

#### SUMMARY

The value of sodium silicofluoride in removing whipworms from swine was discovered while seeking a new ascaricide. Field observations indicate that whipworm infection may be present in nearly all unthrifty pigs in several cornbelt states. Precautions and dosage schedules are discussed.

<sup>1</sup>Spindler, L. A.: Internal Parasites of Swine. In "Keeping Livestock Healthy," Yearbook of Agriculture, U.S.D.A., Washington, D. C. (1942): 757-758.

*Canicola Fever in Man from Swine.*—Five cases of *Leptospira canicola* infection among workers in swine, in Scotland, are reported. On 12 farms, 19 (40%) of 47 workers showed serological evidence of having been infected. On one farm, 46 of 75 pigs were positive to *L. canicola*, and on another, 40 of 98 were positive. When 6 unexposed pigs were placed on one of these farms, 4 developed antibodies in three to eight weeks; in 47 days, they were excreting leptospires in their urine.

When pigs were inoculated with *L. canicola* cultures by six different routes, those inoculated subcutaneously and through a scarified area of the skin developed antibodies within ten days but showed no signs of infection. Others inoculated by these two routes, with urine from infected pigs, developed antibodies within 13 days; they showed only a slight febrile reaction and a tendency to be less vigorous.—*Brit. Med. J.* (Feb. 2, 1957): 257.

## Nutrition and Bacterial Infection

Present evidence indicates that certain B vitamins, notably pyridoxine, pantothenic acid, and folacin, play a significant role in antibody synthesis and that antibody production is diminished in severe protein deficiency. *Corynebacterium*, isolated from lesions of young pantothenic acid-deficient rats, produced a similar disease when inoculated into other pantothenic-deficient rats, but rats on complete diets were resistant. The susceptibility to infection increased steadily from the tenth to fortieth day on the pantothenic acid-deficient diet.

When noninoculated rats were placed in contiguous cages, infection was widespread in those on a pantothenic acid-deficient diet, while no infection developed in comparable animals on a complete diet or on diets deficient in pyridoxine or partially deficient in thiamine. However, the rate of infection varied with the strain of rats.—*Nutr. Rev.*, Feb., 1957.

## Calf Digestion and Cud

The transfer of fresh, warm cuds from healthy cattle to calves as young as 2 weeks old is the only quick method of establishing many of the rumen bacteria and protozoa. Inoculated calves fed a high roughage ration were better able to digest cellulose and protein. They showed an increased thiamine synthesis and developed more acetic and butyric acid but less propionic acid in the rumen. However, when their ration consisted of two parts of good quality hay to one part of a simple grain mixture, calves did not benefit from cud inoculation.

All dried rumen preparations tested have been of no value in establishing rumen microorganisms or in improving calf performance.—*Hoard's Dairyman*, Feb. 25, 1957.

*Estrogen in Fattening Lambs.*—Twelve 83-lb. lambs, 5 months old, in Scotland, were each given a synthetic estrogen pellet (15 mg. hexoestrol) subcutaneously in an ear and, 50 days later when the pellet could no longer be palpated, another 15 mg. pellet was implanted. By the ninety-sixth day, these lambs had made significantly (25%) greater daily gains and their carcasses were as well finished as those of controls. Their feeding efficiency was increased; the fat deposition somewhat de-

creased; but, of greatest interest, the capacity to convert feed protein to meat protein was increased 31 per cent.—*Nature*, Feb. 2, 1957.

*More on Estrogen for Lambs.*—Estrogen implant caused slight but insignificant gains in weight, a reduction in carcass fat, but no change in carcass conformation when given to unweaned 30-lb. lambs in Britain. Death from rectal and vaginal prolapse occurred in 4 lambs.—*Vet. Bull.*, Item 627 (Feb., 1957): 97.

## Notes on Feeding the Breeding Ewe

The number of ova produced at estrus in the ewe can be influenced by the feeding program. Years ago, in Australia, a flock of ewes was divided into two similar lots of 350 each; one lot was "flushed," the other lot was maintained on the usual farm feeding program. Since flushing requires that the animals be "in rising condition" at the time of mating, these ewes were first fed so poorly the first four weeks of the six weeks prior to mating that their weights gradually fell. Then, two weeks before mating, and continuing for two weeks after, they were given excellent feed so that their weight was rising. After this, the two lots were fed similarly.

While the conception rate differed little in the two lots, the flushed ewes had 63 sets of twins and a lambing percentage of 109; the controls had eight sets of twins and a lambing percentage of 91.

Feeding is particularly important during the last 50 days of gestation when the fetus makes 75 per cent of its growth and the udder increases likewise. Undernourishment in this period can result in pregnancy toxemia and other ills. The more they walk in search of feed, the more energy they require. Ewes allowed to become fat during early pregnancy are more apt to develop this toxemia.—*McKenna and Bray* in *J. Agric. South Australia* (Feb., 1957): 279.

*Restricted Feeding of Growing Poults.*—Restricting the feed of growing poult has not been found to affect subsequent egg production, egg weight, body weight (after 6 weeks of production), fertility, hatchability, or mortality if later rations are adequate.—*East. Feed Merchant* (Jan., 1957): 42.

# Editorial

## Veterinary Specialization and Education

GUEST EDITORIAL (Requested)

Until early in the twentieth century, there was hardly any specialization of function in the field of veterinary medicine. Nearly all veterinarians were private practitioners who gave most of their attention to ailments of horses. Under these circumstances, the curricular requirements of veterinary schools were simple.

On June 30, 1906, the present Meat Inspection Service was created by act of Congress. On the following day, the great campaign which led to the eradication of the southern cattle tick and Texas fever of cattle was inaugurated. These events opened the doors to the employment of large numbers of veterinarians in new types of activity. It was the beginning of specialization within the profession. Specialization in veterinary medicine has now progressed to the point where schools are expected to train men to serve not only as general practitioners but as small animal practitioners, poultry disease specialists, meat and food hygiene specialists, animal nutritionists, zoo veterinarians, specialists in the zoonotic diseases, teachers, research workers, military veterinarians, public health veterinarians, *ad infinitum*.

To keep pace with rapidly accumulating new knowledge produced by research and the expanding field of activity, great changes have been made in the curriculums of veterinary schools. At the turn of the century, it was possible to obtain a good (by standards of the time) veterinary education in about eight years, counting from the time that the common school education began (6 years of grade school plus 2 years professional). Now, more than twice this time is required (12 years grade and high school plus 2 years preprofessional and 4 years professional = 18 years). The young man who enters the profession today not only has a much better general education than previously, the better to enable him to take his place in society as an enlightened citizen, but he has a technical education that is infinitely better. These facts are gradually becoming known to the public, which has been impressed thereby. The best evidence of this lies in the increase in numbers and the improvement in quality of the young people who now seek admission to veterinary schools. Younger veterinar-

ians today often feel that their profession is not fully appreciated by the public. This is true, but they would feel better about it, perhaps, if they realized the extent of the advancement that has been made during the lifetime of many of the older, still active, members of the profession.

### ARE CURRICULUM CHANGES NEEDED?

Teachers and administrators of veterinary schools are constantly criticized by many members of the profession for not giving greater curricular attention to areas of work in which they (the critics) are especially interested. Those in health fields feel that there should be more instruction in what they term "veterinary public health." Government officials want more attention given to the field of "regulatory" activities. The poultry industry thinks that not enough instruction is given in poultry diseases. Others want more work in nutrition, in diseases of fur-bearing animals, in inspection of meat and meat-food products, in diseases of household pets, in breeding diseases, especially of cattle. And so it goes.

What should be done about such criticisms? I do not deny that most of them have some validity, but can the veterinary colleges give more instruction in all of these specialties without making serious sacrifices in the teaching of the basic subjects which underlie all of them?

Those who have responsibility in the field of veterinary education probably have given more thought to these matters than anyone else. I am sure that all of these will agree that we are now giving about as much instruction as can be given in a four-year professional curriculum, and that room for additional work can be found only by eliminating some of the subjects now taught, or by reducing the time allotted to them. Drastic reductions in the time allotted to some subjects already have been made. Gross reductions have been made in the time devoted to gross anatomy (figuratively, over the dead bodies of many anatomists!), and lesser reductions in some of the others. *Materia medica* and *pharmacy* have been all but eliminated by most schools. These things had to be done to find room for new subjects such as genetics,

radiology, pharmacology, and virology, and expansion of other subjects such as parasitology. Since knowledge in all fields is increasing rapidly, teachers are being forced to squeeze their own courses in order to fit time-periods which they know can not be increased. The possibilities of additional squeezing of such courses to make room for others is distinctly limited.

One solution would be to lengthen the curriculum. Eventually, this may have to be done but, so far as I know, none of the schools is contemplating such a move in the near future. As it is, the present six-year college course is enough to discourage some good prospective applicants. Too long a period of preparation, in view of the modest financial returns that may be expected by the graduates, may drive away many of the farm-raised boys who are generally our best recruits.

Another solution would be to allow specialization within the basic curriculum. If this were done, those interested in general practice presumably would follow very much the same course outline that we have today, whereas those who were interested in specialties would substitute courses in their special interests for some of those now required. If all students were required to complete all of the basic courses before specialization was allowed (any other program would be pedagogically unsound), it would mean that required clinical training of all students would be abandoned and some would be allowed to pursue other special interests instead. This situation would create some problems, one of the most immediate of which would be the question of how many of these would be able to pass state board examinations. Also,

since presumably all would qualify for the D.V.M. degree, many would have serious educational deficiencies in areas in which the public expects veterinarians to be versed.

#### EDUCATION CONTINUES AFTER GRADUATION

Professional schools never make experts of their graduates. Those who complete the curriculum of any of the veterinary colleges are perhaps best trained to enter private practice, yet they have much to learn and really can not qualify as experts until they have had several years of practical experience. If they enter government service, accept employment in industry, become teachers or research workers, enter the field of public health, or take up any of the other specialties, they must acquire expertise by several years' experience on the job or in graduate training.

It seems to the writer, therefore, that the essential job of the veterinary schools is to give a sound, general, basic training in the fundamental sciences which underlie the prevention, control, and treatment of animal diseases, and then to give some indication to the students of the applications of the education they have received. If this is well done, the student should be possessed of a solid foundation upon which expertise can be built in any of its applications. In other words, the function of the undergraduate curriculum in veterinary medicine is to supply the foundational knowledge, and the application of such knowledge is a postgraduate function. If this concept prevails, there is no immediate necessity of lengthening the present four-year professional curriculum.—W. A. Hagan, D.V.M., Ithaca, N. Y.

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The Museum of Art in Cleveland, the AVMA Convention (August 19-22) city, is situated on the east side of beautiful Wade Park. The Museum, one of the world's leading art centers, is famous for its period paintings.



# Current Literature

## ABSTRACTS

### Propagation of Hog Cholera Virus

*In vitro* propagation of hog cholera virus was readily established in a fluid medium (modified Tyrode's) containing minced tissue of swine spleen. By serial passages of three or four days' incubation, the fifteenth passage gave a  $10^{-8}$  infectivity titer when tested in swine. Dilutions of  $10^{-4}$ ,  $10^{-5}$ ,  $10^{-6}$ , and  $10^{-7}$  were injected into pigs in 2-cc. amounts, using 2 pigs for each dilution. Those pigs receiving  $10^{-6}$  dilutions or lower died from hog cholera, while those receiving higher dilutions remained normal.

Crystal violet vaccines separately prepared with virus from the tenth, eleventh, and twelfth passages failed to produce any detectable degree of immunity in swine given subcutaneous injections of 10 cc.

An agent which produced discoloration of the medium was propagated concomitantly with the hog cholera virus. By *in vitro* titration, it was shown to have a titer varying from  $10^{-7.6}$  to  $10^{-5.2}$ . A correlation between the titers of the two propagated agents was not demonstrated.—[C. N. Dale and J. S. Songer: *In Vitro Propagation of Hog Cholera Virus. I. Method of Cultivation and Observations on Color Changes in the Medium*. *Am. J. Vet. Res.*, 18, (April, 1957): 362-368.]

### Neutralization of Newcastle Disease Virus

Methods utilizing monolayer tissue cultures of chicken embryo tissues for the performance of titrations and neutralization tests of Newcastle disease virus (NDV) are described. Virus titers were determined either by the method of direct microscopic observation of cell destruction or by the appearance of hemagglutinins.

Results of titrations and neutralization tests in tissue culture were found to be comparable though not identical with those found in embryonating eggs.—[R. Goldwasser and A. Kohn: *Neutralization and Titration of Newcastle Disease Virus*. *Am. J. Vet. Res.*, 18, (April, 1957): 390-395.]

### Development of Germinal Epithelium in Bulls

The testes of 5 prenatal and 16 postnatal calves were studied. Changes in the testicular weight, diameter of the seminiferous tubules, and evolution of the histological elements depend more on the stage of development of the individual animals than on breed. From early fetal life until the calves were about 4 months old, the seminiferous tubules were filled with intratubular matrix. From this age to about 5½ months, the enlargement of the tubules and the dissolution of the matrix formed the definitive lumens.

The sex cords of a fetus of 3 months exhibited two kinds of cells, the large and small cells, also called primordial and indifferent cells by many authors. These two kinds of cells continued to behave as different entities throughout fetal develop-

ment to about 2 months of postnatal life. The so-called "primordial germ cells" gradually disappeared from the seminiferous tubules, leaving no trace of descendants. The definitive germinal epithelium arose from the small cells which were lined along the basement membrane of the tubules.

Primary spermatocytes were observed in the testes of calves 70 to 71 days of age. Amitotic division within the seminiferous tubules was frequent in prenatal and early postnatal life. Giant cells were observed in many of the testes studied. Testicular biopsy in immature bulls showed no noticeable effect on the normal development of the germinal epithelium.—[Enrique Santamarina and R. P. Reece: *Normal Development of the Germinal Epithelium and Seminiferous Tubules in the Bull*. *Am. J. Vet. Res.*, 18, (April, 1957): 261-278.]

## BOOKS AND REPORTS

### Clinical Diagnosis of Internal Diseases of Domestic Animals

This fifth edition of the well-known classical textbook, published originally in 1911 by Dr. Marek, has generally retained the original arrangement; however, there are new chapters on electrocardiography, liver function test, and taking blood samples from pigs, and some chapters are discussed in greater detail.

The book is supplemented with many instructive illustrations and some good tables. Recent scientific and technical progress in veterinary diagnostic methods are clearly reported.

It should be helpful for students of veterinary medicine as well as for the practitioner.—[Textbook of Clinical Diagnosis of the Internal Diseases of Domestic Animals (Lehrbuch der klinischen Diagnose der inneren Krankheiten der Haustiere). By J. Marek and J. Mócsy. 536 illustrations. 16 tables. Gustav Fischer Verlag, Villengang 2, Jena, Germany. 1956. Price about \$10.00.]—FRANK KRAL.

### The Genesis of the Rat Skeleton

This unusually fine laboratory atlas depicts, with charts, radiographs, and drawings, the chronology of the ossification centers of the rat; the development of the skull and neck, of the extremities, and of the axial and appendicular skeleton up to 53 days after conception. The purpose of the atlas is "to make available to both student and research laboratories a comprehensive macroscopic demonstration of the establishment of ossification centers in the rat" and "facilitate investigations in which a quantitative assay of skeletal differentiation and/or growth is needed." The book is large (12 by 18 in.), printed on heavy enamel paper, and the charts and radiographs are excellent.—[The Genesis of the Rat Skeleton—A Laboratory Atlas. By Donald G. Walker and Zolton T. Wirtschafter. Charles C. Thomas, 301-327 East Lawrence Ave., Springfield, Ill. 1957. Price \$7.50.]

# THE NEWS

## Symposium on Antibiotics

The fifth annual symposium on antibiotics sponsored by the Food and Drug Administration, Division of Antibiotics, U. S. Department of Health, Education, and Welfare, will be held on Oct. 2-4, 1957, at the Willard Hotel, 14th St. and Pennsylvania Ave., N. W., Washington, D. C.

## Livestock Conservation Appoints New General Manager

Livestock Conservation, Inc., has announced the appointment of Mr. Rollo E. Singleton, Columbia, Mo., as general manager to succeed the late Walter Lloyd.

Mr. Singleton has served as director, Livestock Division, Missouri Department of Agriculture, since 1944. For the past four years, he has acted as assistant commissioner of agriculture in Missouri.

## Minnesota Veterinary School to Become College

What is now the School of Veterinary Medicine in the Institute of Agriculture on the University of Minnesota's St. Paul campus will become the College of Veterinary Medicine, effective July 1, thus separating it administratively from the Institute. This action was taken by the University's Board of Regents at their May 10 meeting.

Dr. W. T. S. Thorp, who has been assistant dean in the Institute of Agriculture and director of the School of Veterinary Medicine, will become dean of the College of Veterinary Medicine. Dr. Thorp came to the University from the U. S. Public Health Service, National Institutes of



Dean W. T. S. Thorp

Health, in July, 1954. The School of Veterinary Medicine was established by the Minnesota legislature in 1947. Dr. W. L. Boyd, now retired, was the first director.

The importance of veterinary medicine to the livestock and poultry industries and its contributions through research and service, in addition to training doctors of veterinary medicine for this area, were the main factors leading to its establishment on a college basis comparable to the other professions.

## AMONG THE STATES AND PROVINCES

### Alabama

**Dr. Simms Presented Zeta Award.**—Dr. B. T. Simms, assistant administrator, ARS, U.S.D.A., received the Zeta award of Omega Tau Sigma fraternity on Feb. 27, 1957. Presentation was made at the award senior



Left to right—C. H. Pals; James Williams; B. T. Simms; Henry W. Hall, Jr., president of Zeta chapter of Omega Tau Sigma; Mrs. Minnie Hamil; T. C. Fitzgerald; and A. C. Newman, president of Zeta chapter's alumni association.

banquet of the fraternity at Alabama Polytechnic Institute, at which Dr. Simms was the guest speaker.

Other guest included James Williams, head, Program Services, Animal Disease Eradication Branch, ARS, U.S.D.A., Washington, D. C.; C. H. Pals, assistant chief, Meat Inspection Service, Washington, D. C.; Mrs. Minnie Hamil, Omega Tau Sigma housemother; and R. S. Sugg, dean; T. C. Fitzgerald, faculty advisor and head, Department of Anatomy and Histology; W. J. Gibbons, professor of veterinary medicine, Alabama Polytechnic Institute, Auburn.

• • •

**Women's Auxiliary.**—The ninth annual meeting of the Women's Auxiliary to the Alabama V.M.A. was held at the Decatur Country Club, Decatur, on March 18, 1957.

Mrs. Ty Irby, president, opened the business session. It was voted to contribute \$5 to the AVMA Research Fund, \$5 to the Women's Auxiliary Award Fund, and to continue the \$50 I. S. McAdory scholarship to be given to an outstanding freshman at Alabama Polytechnic Institute.



Left to right (seated)—Mrs. Joe Sledge, president; Mrs. J. W. Hazelrig, vice-president; and Mrs. C. G. Peacock, secretary-treasurer. Standing are Mrs. J. W. Copeland, historian, and Mrs. L. E. Irby, retiring president.

Mrs. M. K. Heath reported on the AVMA annual meeting held in San Antonio last October. Mrs. B. N. Lauderdale was elected delegate to the AVMA Women's Auxiliary meeting to be held in Cleveland next August.

New officers elected for the coming year are Mrs. Joe Sledge, Greensboro, president; Mrs. J. W. Hazelrig, Birmingham, vice-president; Mrs. Charles Peacock, Eutaw, secretary-treasurer; and Mrs. J. W. Copeland, Decatur, historian.

The 1958 meeting will be held in Tuscaloosa, Ala.

s/Mrs. C. G. PEACOCK, Secretary.

### Arizona

**Central Association.**—The regularly scheduled meeting of the Central Arizona V.M.A. was held on April 9, 1957, with K. L. McLeod as host. The speaker, Mr. J. C. Evans, secretary, Arizona Livestock Sanitary Board, discussed the new state meat inspection law and its operation.

The following officers were elected for the ensuing term: K. Maddy, president; F. Benton, vice-president; and J. W. Langley, Jr., secretary-treasurer. s/j. W. LANGLEY, JR., Secretary.

### Illinois

**Northern Association.**—The thirty-sixth annual meeting of the Northern Illinois V.M.A. was held in Rockford on April 17, 1957.

Speakers included F. E. Connor, Morris; Paul T. Candalin, Madison, Wis.; A. K. Merriam, Springfield; C. A. Brandley, Urbana; George Woods, Urbana; W. H. Beckenhauer, Lincoln, Neb.; and Harold Held, Freeport.

### Kansas

**Dr. Fowler Appointed to Kansas State College Staff.**—Dr. George R. Fowler, professor of veterinary medicine and surgery at Iowa State College, has been appointed to the Kansas State College staff to conduct a three-month animal surgery seminar in Calcutta, India.

Dr. Fowler's work in India is in connection with the International Cooperation Administration-India-Kansas State College work there.

### Maine

**State Association.**—The spring meeting of the Maine V.M.A. was held in Orono on April 10, 1957.

The program included educational movies, reports from the state department of agricultural and federal veterinarians, a panel discussion of problems in small animal practice, and a presentation on research into acetonemia and milk fever.

### Michigan

**Southeastern Association Sponsors Radio Program.**—"Let Your Pet Speak" is the title of a 30 minute radio program sponsored by the Southeastern Michigan V.M.A. The program is scheduled for the second Monday of each month over radio station WJBK in Detroit, Mich.

The format of the program provides for approximately 15 minutes devoted to a discussion of one of the broad phases of veterinary medicine by two members of the association, and the remainder of the time is used in answering questions telephoned to the station by listeners.

Subjects discussed this far include the ever-present problem of rabies, the common infec-

tious diseases of dogs, popular misconceptions and superstitions about animals, and your pets' teeth.

### Minnesota

**State Board Examination.**—The next Minnesota veterinary examination will be held on July 8-9, 1957, in the Auditorium, State Office Building, St. Paul, at 8 a.m.

Applications can be secured from A. C. Spannaus, executive secretary, State Office of Minnesota Veterinary Examining Board, Waconia, Minn.

### New Brunswick

**Maritime Associations.**—The eighth annual joint conference of Maritime Veterinary Associations will be held at Mount Allison University, Sackville, N. B., on June 25-27, 1957.

Speakers will include D. L. T. Smith, Ontario Veterinary College, Guelph; C. K. Roe, Ontario Veterinary College, Guelph; Edith Williams, Toronto, Ont.; Jean Rumney, Hamilton, Ont.; Colin Brown, Truro, N. Sask.; Douglas Mitchell and H. Konst, Animal Diseases Research Institute, Hull, Que.; Arnold H. Kennedy, Whitbourne, Newfoundland; Charles A. Mitchell, president, Canadian V.M.A.; Kenneth Wells, veterinary director general; and O. S. Nordland, Kingston, Ont.

### North Carolina

**State Association.**—The fifty-sixth annual summer meeting of the North Carolina State V.M.A. will be held at the Grove Park, Asheville, on June 25-27, 1957.

Speakers will include Wade Brinker, Michigan State University, East Lansing; Frank Kral, University of Pennsylvania, Philadelphia; Fred Neal, Texas A. & M. College, College Station; Wayne Riser, executive secretary, American Animal Hospital Association, Skokie, Ill.; J. C. Siegrist, Ridgewood, N. J.; and L. A. Branch, Franklin, Va.

• • •

**Women's Auxiliary.**—The Women's Auxiliary to the North Carolina State V.M.A. is sponsoring a surplus instrument and equipment sale in connection with the association's annual meeting. The proceeds will be credited to the veterinarian donating such instruments as contributions to the North Carolina Veterinary Medical Research Foundation.

A committee of five members will be appointed to administer such funds as are accumulated by the sale of these instruments as well as other donations from those interested in this foundation.

### Texas

**Conference for Veterinarians.**—The tenth annual Texas conference for veterinarians will be held on June 6-7, 1957, at College Station.

Guest speakers on the program will include Justin M. Andrews, assistant surgeon general, U. S. Public Health Service, Washington, D. C.; W. J. Gibbons, Alabama Polytechnic Institute, Auburn; B. F. Hoerlein, Alabama Polytechnic Institute, Auburn; C. L. Nelson, practitioner, Jewell, Iowa; and M. J. Twiehaus, Kansas State College, Manhattan.

## U. S. GOVERNMENT

**Veterinary Personnel Changes.**—The following changes in the force of veterinarians in the U.S.D.A. are reported as of April 2, 1957.

### TRANSFERS

Albert J. Beatty, from Sioux City, Iowa, to Berkeley, Calif.

Thomas A. Gage, from Pembina, N. Dak., to Washington, D.C.

Gerald V. Peacock, from Berkeley, Calif., to Omaha, Neb.

Howard H. Reed, Jr., from Denver, Colo., to West Fargo, N. Dak.

Hans P. Vinkel-Jensen, from St. Louis, Mo., to Los Angeles, Calif.

Les B. Williams, from Spokane, Wash., to Omaha, Neb.

William R. Winner, from Madison, Wis., to Fort Worth, Texas.

### RETIREMENTS

John E. DeCamp, Springfield, Ill.

D. Norman Hanson, Sioux Falls, Iowa.

Thomas K. Jones, Springfield, Ill.

Henry W. Schirmer, South St. Joseph, Mich.

Charles L. Ury, Des Moines, Iowa.

Andrew L. Walsh, South St. Paul, Minn.

## STATE BOARD EXAMINATIONS

**CALIFORNIA**—June 13-15, 1957, Davis. Gaylord K. Cooke, 1932 Yosemite Rd., Berkeley 7, Calif., secretary.

**FLORIDA**—June 17-19, 1957, Miami. E. L. Matthews, P.O. Box 141, Palatka, Fla., secretary.

**KENTUCKY**—June 17 and July 29, 1957, Frankfort. J. K. Bushnell, Paris, Ky., secretary.

**MARYLAND**—June 19, 1957, Baltimore. Dr. Harold S. Gober, 5400 Park Heights Ave., Baltimore 15, Md., secretary.

**MICHIGAN**—June 10-11, 1957, Lansing. Lee Davison, 641 Lewis Cass Bldg., Lansing 13, state veterinarian.

**MINNESOTA**—July 8-9, 1957, St. Paul. A. C. Spannaus, executive secretary, Minnesota Veterinary Examining Board, Waconia, Minn.

**MONTANA**—June 24-26, 1957, Bozeman. J. W. Safford, secretary-treasurer, Montana Board of Veterinary Medical Examiners, Capitol Station, Helena.

**NEW JERSEY**—June 28-29, 1957, Trenton. Joseph A. S. Miller, P.O. Box 172, Deal, secretary.

**NEW YORK**—June 12-13, 1957. Practical examination, Ithaca. Mr. James O. Hoyle, secretary, 23 S. Pearl St., Albany. Week of July 8, 1957. Written examinations: New York City, Albany, Syracuse, Buffalo, Rochester.

**NORTH CAROLINA**—June 24-26, 1957, Asheville. Dr. James I. Cornwell, secretary, 65 Beverly Road, Beverly Hills, Asheville.

**OHIO**—June 4-5, 1957, Columbus. Office of the Secretary Ex-Officio, Division of Animal Industry, Room 720, State Office Building, Columbus 13, Ohio.

**SOUTH DAKOTA**—June 24-25, 1957, Pierre. Glenn B. Rea, Livestock Sanitary Board, State Office Building, Pierre, S. Dak., secretary.

**TENNESSEE**—June 24-25, 1957, Nashville. Dr. W. O. Greene, secretary, State Office Bldg., Nashville.

TEXAS—June 3-4, 1957. College Station. Mr. T. D. Weaver, executive secretary, Texas State Board of Veterinary Medical Examiners, 207 Capital National Building, Austin 16, Texas.

## DEATHS

Star indicates member of AVMA

**Clarkson Addis** (UP '17), 61, Collegeville, Pa., died on March 16, 1957, of a heart attack. Dr. Addis is survived by his widow, a daughter, and three sons.

**Sanford T. Bodendistel** (ONT '30), 54, died in Guelph, Ont., on Feb. 9, 1957.

Dr. Bodendistel practiced for 20 years in Stouffville, Ont., and had recently become associated with the Austin Laboratories, Ltd., in Guelph.

He is survived by his widow, a daughter, and a son who is presently a student at Ontario Veterinary College.

**Charles Coliton** (ONT '13), 66, died in Belleville, Ont., on Dec. 15, 1956.

Dr. Coliton had been employed by the Health of Animals Division of the Department of Agriculture in Toronto prior to his retirement.

**★Robert W. Culbert** (MCK '08), 78, died in Fort Dodge, Iowa, on March 24, 1957.

Dr. Culbert served as inspector in charge of federal meat inspection in St. Louis, Mo., prior to his retirement. He was a life member of the AVMA.

He is survived by a brother and a sister.

**Paul N. Darlington** (KCV '15), 63, Chanute, Kan., died on Jan. 30, 1957, in Wichita, Kan. Dr. Darlington was with the meat inspection department of the Kansas State Board of Health and was a member of the Kansas Veterinary Medical Association.

He is survived by his widow, one sister, and five brothers.

**Walter Grass** (ONT '08) died in Dresden, Ont., on Aug. 28, 1956. Dr. Grass had practiced in Dresden for many years.

**★Roy A. Groshong** (KVC '18), 67, died in Selma, Calif., on March 4, 1957.

Dr. Groshong had practiced in Selma for 31 years prior to his retirement because of ill health in 1951.

He was a life member of the AVMA.

**Charles E. Hutt** (UP '28), 76, Hatfield, Pa., died on Feb. 16, 1957. Dr. Hutt was employed by the Bureau of Health for 32 years and, later, was assigned to a canned food plant by the U. S. Government.

He is survived by one daughter and two sisters.

**C. C. Kinsley** (KCV '05), 82, Oakley, Kan., died on Dec. 29, 1956. Dr. Kinsley had practiced in Oakley for 46 years.

He is survived by his widow, a brother, and three sisters.

**R. B. McCord** (COR '13), 67, North East, Pa., died on March 25, 1957. Dr. McCord served as postmaster of North East from 1924 until 1933 and was county treasurer from 1936 through 1940.

He is survived by his widow.

**Donald M. McDonald** (MCG '91), 89, Minneapolis, Minn., died on Feb. 15, 1957, at Naperville, Ill. Dr. McDonald had been a member of the Minnesota Livestock Sanitary Board for more than 40 years prior to his retirement.

He had been a member of the AVMA for many years.

**★Allen J. Miller** (API '18), 60, died in Robertsdale, Ala., on March 7, 1957.

Dr. Miller had served with the Mobile County Health Department for a number of years and, since 1950, with the Baldwin County Health Department.

Dr. Miller had been a member of the AVMA since 1940. He is survived by his widow and a son.

**Irvin William Moynihan** (ONT '36), 43, Vancouver, B.C., died on Jan. 27, 1957. Dr. Moynihan was chief of the Animal Diseases Research Institute in Vancouver.

He is survived by his widow and two children.

**★Charles A. Silverman** (COL '44), 44, Mitchell, Neb., was killed as a result of a train collision on Feb. 12, 1957. Dr. Silverman had practiced in Mitchell since 1947. He had been a member of the AVMA since his graduation from Colorado State College.

He is survived by his widow, three sons, and two daughters.

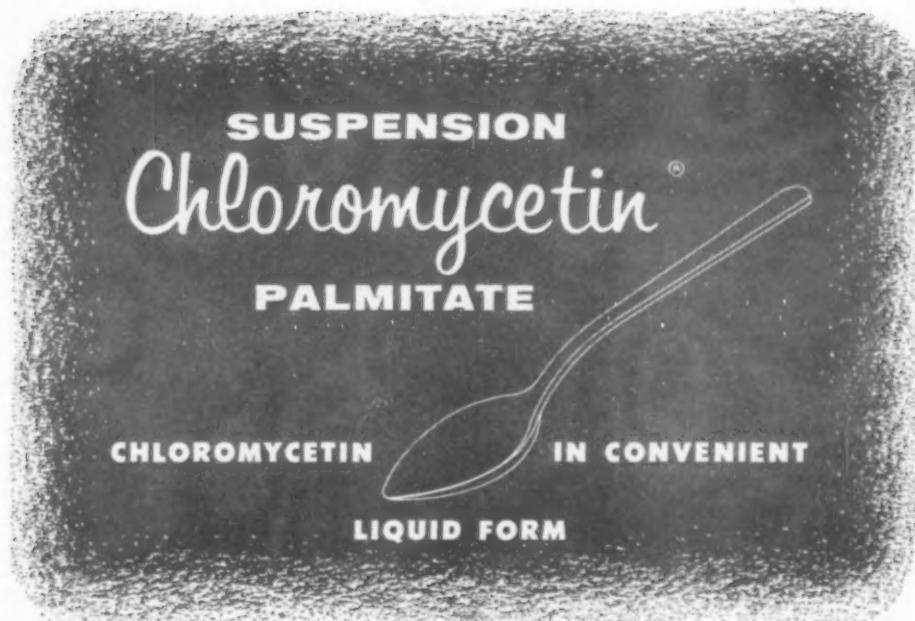
**Orville A. Stingley** (KCV '02), 80, Topeka, Kan., died Jan. 27, 1957, at Manhattan, Kan. Prior to his retirement in 1944, Dr. Stingley was a meat inspector with the BAI.

**Frederick A. Zucker** (AVC '96), 83, Union, N. J., died on March 4, 1957. Dr. Zucker was one of the first organizers and the first president of the Union County S.P.C.A.

He is survived by his widow, two sons, two brothers, and a sister.

The friends of Col. Claude F. Cox, U. S. Army, Retired, Watsonville, Calif., will be pleased to know that he is not the Claude Cox reported in the death notices, April 15, Journal.

The Journal was in error in listing Watsonville, Calif., as the address of Dr. Claude Cox, deceased. It should have read Clemons, Iowa.



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PROFESSIONAL LITERATURE AVAILABLE ON REQUEST

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## Ninety Fourth Annual AVMA Meeting Cleveland—August 19-22, 1957

### Airways to Cleveland

For those who must consider the time element when making plans to attend the 1957 AVMA Convention, Cleveland is served by seven airlines: Allegheny, Capital, Eastern, Lake Central, Trans-Canada, Trans-World, and United.

### Shipways to Cleveland

Cleveland is a port of call for the Georgian Bay Lines' two Great Lakes steamships, the *North American* and *South American*. This year, no post-convention tours are offered by the Association, but a cruise on the Great Lakes lasting overnight or a full week can provide a vacation extra for conventioneering families. More complete tour information and vacation possibilities in Ohio will be discussed in future issues of the JOURNAL.

The *SS. North American* leaves Chicago on Saturday, August 3, visits Mackinac Island, Detroit, and Buffalo and arrives at Cleveland by 7 a.m. Wednesday morning, August 7. It leaves Chicago again on the 10, reaching Cleveland on the 14.

The *SS. South American* sails overnight from Buffalo to Cleveland. Her other ports of call include Detroit, Mackinac, Munising, Houghton, and Duluth. Leaving Buffalo, N.Y., at 7 p.m. (E.D.T.) Saturday, August 17, the ship will arrive in Cleveland at 6:45 a.m. Sunday, the day preceding the Opening Session of the Convention.

Both ships offer sleeping accommodations, meals, and deck games to keep the family amused under-

way. First class travel from Chicago to Cleveland costs \$110.50 per person including meals. From Buffalo to Cleveland, the fare is \$26.75 per person.

Following the Convention, a two-day cruise in midweek may cost from \$41.50 to \$179.50, depending on accommodations and the length of the cruise up to seven days. Charges are on the American plan which include meals and other services in the price.

### APPLICATIONS

#### Applicants—Members of Constituent Associations

In accordance with paragraph (b) of Section 2, Article X, of the Administrative Bylaws, as revised at the annual meeting of the House of Representatives, Aug. 18, 1951, in Milwaukee, Wis., the names of applicants residing within the jurisdictional limits of the constituent associations shall be published once in the JOURNAL.

The following applicants have been certified as members of the constituent association that has jurisdiction over the area in which the applicant resides. The certification was made by the secretary of the constituent association in accordance with Section 2, Article X, of the Administrative Bylaws.

AARON, EDWARD  
622 Glenmont Dr., Solana Beach, Calif.  
D.V.M., Texas A. & M. College, 1943.

ADAMS, CHARLES R.  
P. O. Box 264, Limon, Colo.  
D.V.M., Colorado A. & M. College, 1948.

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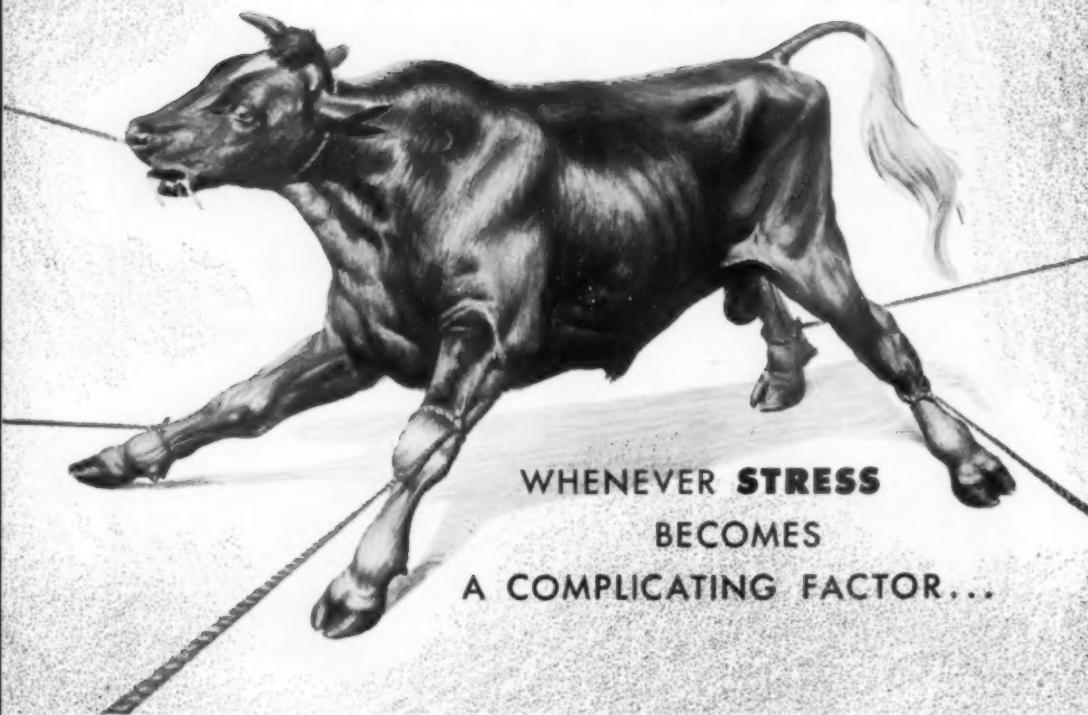
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Fincher, M. G.; Hayden, C. E., and Hall, A. G.:  
Cornell Vet. 30:197 (April) 1940.

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"87 per cent of the cows with uncomplicated ketosis recovered with one treatment."

Link, R. P.; Newton, D. I., and Huber, W. G.:  
Paper presented at 93rd Ann. Meeting, A.V.M.A.,  
Oct. 15-18, 1956, San Antonio, Texas.

For prompt, efficient and economical treatment of bovine ketosis and other stress conditions. Vials of 10 cc.; 10 mg. of prednisolone per cc.

## ORGANIZATION SECTION

COPELAND, CARSON N.  
P. O. Box 1663, Hickory, N. Car.  
D.V.M., Alabama Polytechnic Institute, 1950.

EARL, ALFRED E.  
R.D. No. 2, Morristown, N. J.  
D.V.M., Cornell University, 1941.

GALIUNAS, PETER  
544 Webster St., N.W., Grand Rapids, Mich.  
D.V.M., Veterinary Academy at Kaunas, 1943.

GASKIN, ROBERT B.  
Box 209, Humboldt, Sask.  
D.V.M., Ontario Veterinary College, 1955.

HARGREAVES, RICHARD E.  
P. O. Box 598, Longmont, Colo.  
D.V.M., Colorado A. & M. College, 1942.

HIGGS, WILBUR S.  
Box 155, Madisonville, Tenn.  
D.V.M., University of Georgia, 1951.

JONES, ERIC W.  
242 S. Hester, Stillwater, Okla.  
M.R.C.V.S., University of London, 1946.

KINARD, HAROLD W.  
Box 116, Bamberg, S. Car.  
D.V.M., Kansas State College, 1947.

LEPAR, BRUNO A.  
10500 S. Michigan Ave., Chicago, Ill.  
D.V.M., Kaunas Veterinary College, 1941.

MILLER, FRANK E.  
1224 N. Clark, Chicago, Ill.  
D.V.M., Washington State University, 1946.

PALLADRO, JOHN A.  
Route No. 1, Morrison, Colo.  
D.V.M., Colorado A. & M. College, 1950.

PRAY, JOHN D.  
Box 110, Petoskey, Mich.  
D.V.M., Michigan State College, 1944.

SHARPS, CLAUD W.  
R.F.D. No. 1, Laconia, N. H.  
D.V.M., Michigan State College, 1940.

SMITH, JOHN W.  
907 Grant Ave., Fort Moran, Colo.  
D.V.M., Colorado A. & M. College, 1936.

THOGMARTIN, WILLIAM F.  
1795 W. Highland Ave., San Bernardino, Calif.  
D.V.M., Kansas State College, 1950.

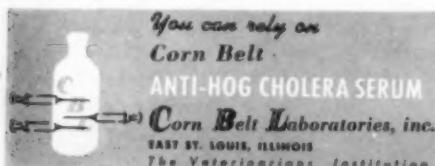
WENIG, JOHN H.  
Box 546, Philip, S. Dak.  
D.V.M., Colorado A. & M. College, 1951.

### Applicants—Not Members of Constituent Associations

In accordance with paragraph (b) of Section 2, Article X, of the Administrative Bylaws, as revised at the annual meeting of the House of Representatives, Aug. 18, 1951, in Milwaukee, Wis., notice of all applications from applicants residing outside of the jurisdictional limits of the constituent associations, and members of the Armed Forces, shall be published in the JOURNAL for two successive months. The first notice shall give the applicant's full name, school, and year of graduation, post office address, and the names of his endorsers.

### Second Listing

GARLICK, GORDON K., American Embassy, A.P.O. 74 Box K c/o Postmaster, San Francisco, Calif.  
VILLEGAS, MIGUEL, Calle 3a No. 17, Campo Alegre, Caracas, Venezuela.



## STUDENT CHAPTER ACTIVITIES

### Michigan

**Michigan State Student Chapter.**—Speakers during the winter quarter meetings of the Michigan State University Chapter of the AVMA were K. Fraser, Niles; A. Schneider, Vicksburg; L. Fisher, Chicago, Ill.; and Frank Booth, Elkhart, Ind.

The following officers were elected for the ensuing term: Robert Scholtens, president-elect; James Boydston, vice-president; William Davis, secretary; Kenneth Smith, treasurer; and Edward Sadilek, sergeant-at-arms. The faculty advisor is Dr. Connor.

S/CAROLYN S. CARTWRIGHT, *Retiring Secretary.*

### Texas

**Texas A. & M. Student Chapter.**—The establishment of an Emergency Aid Fund as an AVMA Student Chapter Activity is being considered by members of the Texas A. & M. College Student Chapter to the AVMA.

On two occasions during the past year, veterinary students at College Station have collected funds to help defray the costs of hospital and medical expenses incurred by two of their classmates. To raise this money, the students sold blood for \$20 a pint.

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## COMING MEETINGS

Texas A. & M. College. Annual conference for veterinarians. Memorial Student Center, College Station, June 6-7, 1957. W. W. Armistead, dean.

Ohio State University. Annual conference for veterinarians. Ohio Union Building, Columbus, June 12, 1957. V. L. Tharp, director, Veterinary Clinics, chairman.

Wyoming Veterinary Medical Association. Annual meeting. Noble Hotel, Lander, June 15-17, 1957. J. F. Ryff, P. O. Box 960, Laramie, Wyo., secretary.

North Dakota Veterinary Medical Association. Annual meeting. Minot, N. Dak., June 17-18, 1957. Dean Flagg, 202 Teton Ave., Bismarck, N. Dak., secretary.

California State Veterinary Medical Association. Annual convention. Hotel Miramar, Santa Barbara, June 17-19, 1957. Charles S. Travers, 3004 16th St., San Francisco, Calif., secretary.

Vermont Veterinary Medical Association. Annual meeting. The Lodge at Smugglers Notch, Stowe, June 18-19, 1957. Dr. A. E. Janawicz, Department of Agriculture, Montpelier, Secretary.

South Carolina Association of Veterinarians. Summer convention. Fort Sumter Hotel, Charleston, June 20-22. Worth Lanier, York, S. Car., secretary.

Alberta Veterinary Medical Association. Annual convention. Lethbridge, Alta., June 21-22, 1957. H. C. Carlson, 9324 148th St., Edmonton, Alta., secretary.

South Carolina Association of Veterinarians. Summer meeting. Fort Sumter Hotel, Charleston, June 21-22, 1957. Worth Lanier, P. O. Box 345, York, S. Car., secretary.

Georgia Veterinary Medical Association. Annual meeting. Athens, June 23-25, 1957. C. C. Rife, 505 Lindbergh Drive, N. E., Atlanta 5, Ga., secretary.

Utah Veterinary Medical Association. Annual meeting. Logan, June 25-26, 1957. J. A. Thomas, P. O. Box 592, Provo, Utah, secretary.

Maritime Veterinary Association. Joint conference. Mount Allison University, Sackville, N. B., June 25-27, 1957. J. F. Frank, Division of Animal Pathology, Box 310, Sackville, N. B., chairman.

North Carolina Veterinary Medical Association. Annual meeting. Grove Park, Asheville, June 25-27, 1957. C. J. Lange, 3741 High Point Rd., Greensboro, N. Car., secretary.

Michigan State Veterinary Medical Association. Annual meeting. Leland Hotel, Detroit, June 26-27, 1957. Paul V. Howard, 4011 Hunsberger, N. E., Grand Rapids 5, Mich., secretary.

Maryland State Veterinary Medical Association. George Washington Hotel, Ocean City, June 27-28, 1957. John D. Gadd, Cockeysville, Md., secretary.

Montana Veterinary Medical Association. Summer meeting. Northern Hotel, Billings, June 28-30, 1957. G. A. Morrison, 316 Central Ave., Great Falls, Mont., secretary.

Symposium on Reproduction and Infertility. Annual meeting. Colorado State University, Fort Collins, July 1-3, 1957. F. X. Gassner, Colorado State University, Fort Collins, Colo., chairman, Committee on Arrangements.

Nebraska State Veterinary Medical Association. Summer meeting. Alliance, July 13-15, 1957. W. T. Spencer, 1250 N. 37th St., Lincoln, Nebr., secretary.

Mississippi State Veterinary Medical Association, Inc. Annual meeting. Hotel Heidelberg, Jackson, July 14-16, 1957. Harvey F. McCrory, Box 536, State College, Miss., secretary.

Kentucky Veterinary Medical Association. Annual meeting. Brown Hotel, Louisville, July 15-16, 1957. Robert H. Singer, 136 Shawnee Place, Lexington, Ky.

Iowa State College. Annual conference for veterinarians. Memorial Union, Ames, July 16-17, 1957. M. S. Hofstad, Veterinary Research Institute, Iowa State College, Ames, program chairman.

Alabama Polytechnic Institute. Annual conference for veterinarians. School of Veterinary Medicine, Auburn, July 21-24, 1957. R. S. Sugg, dean.

Canadian Veterinary Medical Association. Annual meeting. Hotel Georgia, Vancouver, B. C., July 22-24, 1957. James Archibald, Ontario Veterinary College, Guelph, Ont., vice-president.

Colorado Veterinary Medical Association. Annual meeting. LaCour Hotel, Grand Junction, Aug. 9-10, 1957. G. H. Gilbert, 5500 Wadsworth Blvd., Arvada, Colo., secretary.

American Veterinary Medical Association. Annual meeting. Cleveland Auditorium, Cleveland, Ohio, Aug. 19-22, 1957. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

Washington State Veterinary Medical Association. Annual meeting. Monticello Hotel, Longview, Sept. 9-10, 1957. William F. Harris, 1102 E. Main St., Puyallup, Wash., secretary.

New York State Veterinary Medical Society. Annual meeting. Hotel Statler, Buffalo, Sept. 11-13, 1957. M. H. Covert, 138 Inglewood Dr., Rochester 19, N. Y., secretary.

New England Veterinary Medical Association. Annual meeting. Equinox House, Manchester, Vt., Oct. 6-9, 1957. C. Lawrence Blakely, 180 Longwood Ave., Boston, Mass., secretary.

Purdue University. Annual short course for veterinarians. Purdue University, West Lafayette, Ind., Oct. 9-11, 1957. L. M. Hutchings, secretary.

Florida State Veterinary Medical Association. Annual meeting. Fort Harrison Hotel, Clearwater, Oct. 13-15, 1957. Robert P. Knowles, 2934 N.W. 17th Ave., Miami 37, Fla., secretary.

University of Missouri. Annual short course for graduate veterinarians, Oct. 14-15, 1957. School of Veterinary Medicine, University of Missouri, Columbia. Cecil Elder, chairman.

Texas Veterinary Medical Association. Annual meeting. Baker Hotel, Dallas, Oct. 16-18, 1957. Paul B. Blunt, 712 Maverick Blvd., San Antonio, Texas, secretary.

Eastern Iowa Veterinary Association. Annual meeting. Hotel Sheraton-Montrose, Cedar Rapids, Oct. 17-18, 1957. F. E. Brutsman, Traer, Iowa, secretary.

Southern Veterinary Medical Association. Annual meeting. Hotel Roanoke, Roanoke, Va., Oct. 27-30, 1957. A. A. Husman, P. O. Box 91, Raleigh, N. Car., secretary.

Cornell University. Nutrition conference. Cornell University, Ithaca, N.Y., Oct. 31-Nov. 1, 1957. J. K. Losli, Stocking Hall, Cornell University, Ithaca, N.Y., chairman.

Minnesota Veterinary Medical Association. Annual meeting. St. Paul, Jan. 20-22, 1958. B. S. Pomeroy, School of Veterinary Medicine, University of Minnesota, St. Paul 1, Minn.

Kansas Veterinary Medical Association. Annual meeting. Hotel Broadview, Wichita, Feb. 9-11, 1958. K. Maynard Curtis, 5256 Delmar Ave., Kansas City 3, Kan.

### Foreign Meetings

British Veterinary Association. Annual congress. University of Cambridge, Cambridge, England, Aug. 25-31, 1957. Mr. F. Knight, 7, Mansfield St., Portland Place, London, W. 1, general secretary.

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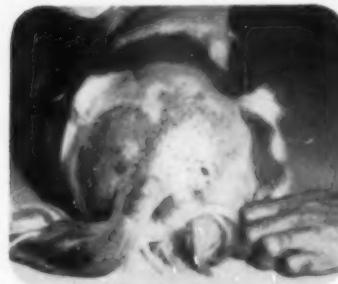
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## Regularly Scheduled Meetings

**ALABAMA**—Central Alabama Veterinary Association, the first Thursday of each month. B. M. Lauderdale, Montgomery, secretary.

**Jefferson County Veterinary Medical Association**, the second Thursday of each month. S. A. Price, 213 N. 15th St., Birmingham, secretary.

**Mobile-Baldwin Veterinary Medical Association**, the first Tuesday of each month. W. David Gross, 771 Holcombe Ave., Mobile, Ala., secretary.

**ARIZONA**—Central Arizona Veterinary Medical Association, the second Tuesday of each month. Keith T. Maddy, Phoenix, Ariz., secretary.

**Southern Arizona Veterinary Medical Association**, the third Wednesday of each month at 7:30 p.m. E. T. Anderson, Rt. 2, Box 697, Tucson, Ariz., secretary.

**CALIFORNIA**—Alameda Contra Costa Veterinary Medical Association, last Wednesday of each month. Leo Goldson, 3793 Broadway, Oakland 11, Calif., secretary.

**Bay Counties Veterinary Medical Association**, the second Tuesday of each month. Maurice L. Boevers, 5394 Mt. Diablo Blvd., Lafayette, Calif., secretary.

**Central California Veterinary Medical Association**, the fourth Tuesday of each month. R. B. Barsaleau, 2333 E. Mineral King, Visalia, Calif., secretary.

**Kern County Veterinary Medical Association**, the first Thursday evening of each month. A. L. Irwin, 301 Taft Highway, Bakersfield, Calif., secretary.

**Mid-Coast Veterinary Medical Association**, the first Thursday of every even month. W. H. Rockey, P. O. Box 121, San Luis Obispo, Calif., secretary.

**Monterey Bay Area Veterinary Medical Association**, the third Wednesday of each month. Lewis J. Campbell, 90 Corral de Tierra, Salinas, Calif., secretary.

**North San Joaquin Valley Veterinary Medical Association**, the fourth Wednesday of each month at the Hotel Co-

pell, in Modesto, Calif. Lyle A. Baker, Turlock, Calif., secretary.

**Orange Belt Veterinary Medical Association**, the second Monday of each month. Chester A. Maeda, 766 E. Highland Ave., San Bernardino, Calif., secretary.

**Orange County Veterinary Medical Association**, the third Thursday of each month. Donald E. Lind, 2643 N. Main St., Santa Ana, Calif., secretary.

**Peninsula Veterinary Medical Association**, the third Monday of each month. R. C. Lawson, 4040 El Camino, Palo Alto, Calif., secretary.

**Redwood Empire Veterinary Medical Association**, the third Thursday of each month. Robert E. Clark, Napa, Calif., secretary.

**Sacramento Valley Veterinary Medical Association**, the second Wednesday of each month. W. E. Steinmetz, 4227 Freeport Blvd., Sacramento, Calif., secretary.

**San Diego County Veterinary Medical Association**, the fourth Tuesday of each month. H. R. Rossell, 1795 Moore St., San Diego, Calif., secretary.

**San Fernando Valley Veterinary Medical Association**, the second Friday of each month at the Casa Escobar Restaurant in Studio City. John Chudacoff, 7912 Sepulveda Blvd., Van Nuys, secretary.

**Santa Clara Valley Veterinary Association**, the fourth Tuesday of each month. Kay Beulley, N. Fourth and Gish Rd., San Jose, Calif., secretary.

**Southern California Veterinary Medical Association**, the last Wednesday of each month. Don Mahan, 1919 Wilshire Blvd., Los Angeles 57, Calif., executive secretary.

**Tulare County Veterinarians**, the second Thursday of each month. R. B. Barsaleau, 2333 E. Mineral King, Visalia, Calif., secretary.

**COLORADO**—Denver Area Veterinary Society, the fourth Tuesday of every month. Richard C. Tolley, 5060 S. Broadway St., Englewood, Colo., secretary.

**Northern Colorado Veterinary Medical Society**, the first Monday of each month. M. A. Hammarlund, School of

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**Veterinary Medicine, Colorado A. & M. College, Fort Collins, Colo., secretary.**

**DELAWARE**—New Castle County Veterinary Association, the first Tuesday of each month at 9:00 p.m. in the Hotel Rodney, Wilmington, Del. E. J. Hathaway, Clifton Park Manor, Apt. 73-5, Wilmington 2, Del., secretary.

**FLORIDA**—Central Florida Veterinary Medical Association, the first Tuesday of each month, time and place specified monthly. Jack H. McElyer, 5925 Edgewater Drive, Orlando, Fla., secretary.

Jacksonville Veterinary Medical Association, the first Thursday of every month, Dodsons Restaurant, P. S. Roy, 4443 Atlantic Blvd., Jacksonville, Fla., secretary.

Northwest Florida Veterinary Medical Society, third Wednesday of each month, time and place specified monthly. T. R. Geci, 108B Catherine Ave., Pensacola, Fla., secretary.

Palm Beach Veterinary Society, the last Thursday of each month in the county office building at 810 Datura St., West Palm Beach. Ross E. Evans, 5215 S. Dixie Highway, West Palm Beach, Fla., secretary.

Ridge Veterinary Medical Association, the fourth Thursday of each month in Bartow, Fla. Paul J. Myers, Winter Haven, Fla., secretary.

South Florida Veterinary Society, the third Tuesday of each month, at the Seven Seas Restaurant, Miami, Fla. E. D. Stoddard, 6432 S. W. 8th St., Miami, Fla., secretary.

Suwannee Valley Veterinary Association, the fourth Tuesday of each month, Hotel Thomas, Gainesville. W. B. Martin, Jr., 3002 N. W. 6th St., Gainesville, Fla., secretary.

Volusia County Veterinary Medical Association, the fourth Thursday of each month. A. E. Hixon, 131 Mary St., Daytona Beach, Fla., secretary.

**GEORGIA**—Atlanta Veterinary Society, the second Tuesday of every month at the Elks Home on Peachtree St., Atlanta, Ga. J. L. Christopher, Smyrna, Ga., secretary.

**ILLINOIS**—Chicago Veterinary Medical Association, the second Tuesday of each month. Mark E. Davenport, Jr., 215 S. Edgewood Ave., LaGrange, Ill., secretary.

Eastern Illinois Veterinary Medical Association, the first Thursday of March, June, September, and December. A one-day clinic is held in May. H. S. Bryan, College of Veterinary Medicine, University of Illinois, Urbana, secretary.

**INDIANA**—Central Indiana Veterinary Medical Association, the second Wednesday of each month. Peter Johnson, Jr. 4410 N. Keystone Ave., Indianapolis 5, secretary. Michiana Veterinary Medical Association, the second Thursday of every month except July and December, at the Hotel LaSalle, South Bend, Ind. J. M. Carter, 3421 S. Main St., Elkhart, Ind., secretary.

Tenth District Veterinary Medical Association, the third Thursday of each month. J. S. Baker, P. O. Box 52, Pendleton, Ind., secretary.

**IOWA**—Cedar Valley Veterinary Association, the second Monday of each month, except January, July, August, and October, at Black's Tea Room, Waterloo, Iowa. H. V. Henderson, Reinbeck, Iowa, secretary.

Coon Valley Veterinary Association, the second Wednesday of each month, September through May, at the Bradford Hotel, Storm Lake, Iowa. D. I. Lee, Sac City, Iowa, secretary.

East Central Iowa Veterinary Medical Society, the second Tuesday of every month. Dr. W. T. Rugger, Oxford, secretary.

Fayette County Veterinary Association, the third Tuesday of each month, except in July and August, at Pa and Ma's Restaurant, West Union, Iowa. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Northeast Iowa-Southern Minnesota Veterinary Association, the first Tuesday of February, May, August, and November at the Wisnesick Hotel, Decorah, Iowa, 6:30 p.m. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

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\*Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.; Vet. Med. 51:413 (Sept.) 1956.

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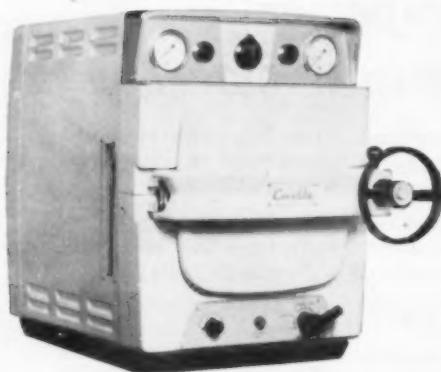
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**KENTUCKY**—Central Kentucky Veterinary Medical Association, the first Wednesday of each month. L. S. Shirrell, Versailles Rd., Frankfort, secretary.

**Jefferson County Veterinary Society of Kentucky, Inc.**, the first Wednesday evening of each month in Louisville or within a radius of 50 miles. W. E. Bewley, P.O. Box "H," Crestwood, secretary.

**MARYLAND**—Baltimore City Veterinary Medical Association, the second Thursday of each month, September through May (except December), at 9:00 p.m. at the Park Plaza Hotel, Charles and Madison St., Baltimore, Md. Harry L. Schultz, Jr., 9011 Harford Rd., Baltimore, Md., secretary.

**MICHIGAN**—Mid-State Veterinary Medical Association, the fourth Thursday of each month with the exception of November and December. Robert E. Kader, 5034 Armstrong Rd., Lansing 17, Mich., secretary.

**Saginaw Valley Veterinary Medical Association**, the last Wednesday of each month. S. Correll, Rt. 1, Midland, Mich., secretary.

**Southeastern Veterinary Medical Association**, the fourth Wednesday of every month, September through May. Gilbert Meyer, 14003 E. Seven Mile Rd., Detroit 5, Mich., secretary.

**MISSOURI**—Greater St. Louis Veterinary Medical Association, the first Friday of the month (except July and August) at the Sheraton Hotel, Spring Ave. and Lindell Blvd. Allen B. Shopmaker, 136 N. Meramec, Clayton 5, Mo., secretary.

**Kansas City Small Animal Hospital Association**, the first Monday of each month, at alternating hospitals. W. F. Noland, 7504 Metcalf, Overland Park, Kan., secretary.

**Kansas City Veterinary Medical Association**, the third Tuesday of each month at Exchange Hall, ninth floor, Livestock Exchange Bldg., 1600 Genesee St., Kansas City, Mo. Busch Meredith, 800 Woodswether Rd., Kansas City 5, Mo., secretary.

**NEW JERSEY**—Central New Jersey Veterinary Medical Association, the second Thursday of November, January, March, and May at Old Hights Inn, Hightstown, N. J. David C. Tudor, Cranbury, N. J., secretary.

**Metropolitan New Jersey Veterinary Medical Association**, the third Wednesday evening of each month from October through April at the Academy of Medicine, 91 Lincoln Park South, Newark, N. J. Myron S. Arlein, 2172 Milburn Ave., Maplewood, N. J., secretary.

**Northern New Jersey Veterinary Association**, the fourth Tuesday of each month at the Cass Mana in Teaneck. James R. Tanzola, Upper Saddle River, secretary.

**Northwest Jersey Veterinary Society**, the third Wednesday of every odd month. F. B. Duke, 49 Taylor St., High Bridge, N. J., secretary.

**Southern New Jersey Veterinary Medical Association**, the third Tuesday of each month at the Collingswood Veterinary Hospital, Collingswood. W. E. Snyder, E. Kings Highway and Munn Ave., Haddonfield, secretary.

**NEW YORK**—New York City, Inc., Veterinary Medical Association of, the first Wednesday of each month at the New York Academy of Sciences, 2 East 63rd St., New York City. C. E. DeCamp, 43 West 61st St., New York 23, N. Y., secretary.

**New York State Veterinary College**, Annual conference for veterinarians. Cornell University, Ithaca. W. A. Hagan, New York State Veterinary College, Cornell University, Ithaca, N. Y., dean.

**Monroe County Veterinary Medical Association**, the first Thursday of even-numbered months except August. Irwin Bircher, 50 University Ave., Rochester, N. Y., secretary.

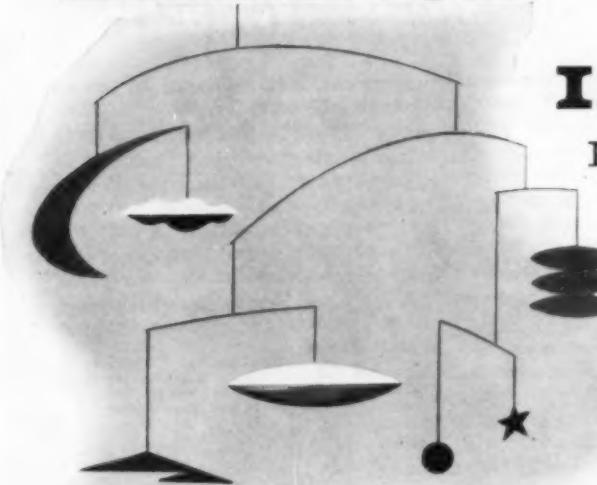
**NORTH CAROLINA**—Central Carolina Veterinary Medical Association, the second Wednesday of each month at 7:00 p.m. in the O'Henry Hotel, Greensboro. Joseph A. Lombardo, 411 Woodlawn Ave., Greensboro, secretary.

**Eastern North Carolina Veterinary Medical Association**, the first Friday of each month, time and place specified

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REFERENCES: 1. Mosier, J. E.: Vet. M. 50:605 (Nov.) 1955.  
2. Belloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956.  
3. Pollock, S.: J. Am. Vet. M. Ass. 139:274 (Sept.) 1956.

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monthly. Byron H. Brow, Box 453, Goldsboro, N. Car., secretary.

Piedmont Veterinary Medical Association, the last Friday of each month. John G. Martin, Boone, N. Car., secretary.

Twin Carolinas Veterinary Medical Association, the third Thursday of each month in the Orange Bowl Restaurant, Rockingham, N. Car., at 7:30 p.m. James R. Burgess, Rockingham, N. Car., secretary.

**OHIO**—Cuyahoga County Veterinary Medical Association, the first Wednesday of each month, September through May (except January), at 9:00 p.m. at the Carter Hotel, Cleveland, Ohio. Ed. R. Jacobs, 5522 Pearl Rd., Cleveland, Ohio, secretary.

**OKLAHOMA**—Oklahoma County Veterinary Medical Association, the second Wednesday of every month, 7:30 p.m., Patrick's Foods Cafe, 1016 N.W. 23rd St., Oklahoma City. Forrest H. Stockton, 2716 S.W. 29th St., Oklahoma City, Okla., secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month in Directors' Parlor of the Brookside State Bank, Tulsa, Okla. Don L. Hohmann, 538 S. Madison St., Tulsa, Okla., secretary.

**PENNSYLVANIA**—Keystone Veterinary Medical Association, the fourth Wednesday of each month at the University of Pennsylvania School of Veterinary Medicine, 39th and Woodland Ave., Philadelphia 4, Pa. Raymond C. Snyder, 39th and Woodland Ave., Philadelphia 4, Pa., secretary.

**SOUTH CAROLINA**—Piedmont Veterinary Medical Association, the third Wednesday of each month at the Fairforest Hotel, Union, S. Car. Worth Lanier, York, S. Car., secretary.

**TEXAS**—Coastal Bend Veterinary Association, the second Wednesday of each month. J. Marvin Prewitt, 4141 Lexington Blvd., Corpus Christi, Texas, secretary.

**VIRGINIA**—Central Virginia Veterinarians' Association, the third Thursday of each month at the William Byrd Hotel in Richmond at 8:00 p.m. M. R. Levy, 312 W. Cary St., Richmond 20, Va., secretary.

Northern Virginia Veterinary Society, the second Wednesday of every month.

day of every third month. Meeting place announced by letter. H. C. Newman, Box 145, Merrifield, secretary. Southwest Virginia Veterinary Medical Association, the first Thursday of each month. I. D. Wilson, Blacksburg, secretary.

**WASHINGTON**—Seattle Veterinary Medical Association, the third Monday of each month. Magnolia American Legion Hall, 2870 32nd W., Seattle, Wash. William S. Green, 9637 S. E. 36th, Mercer Island, Wash., secretary. South Puget Sound Veterinary Association, the second Thursday of each month except July and August. O. L. Bailey, P. O. Box 906, Olympia, Wash., secretary.

**WEST VIRGINIA**—Kyowva (Ky., Ohio, W. Va.) Veterinary Medical Association, the second Thursday of each month in the Hotel Prichard, Huntington, W. Va., at 8:30 p.m. Harry J. Fallon, 200 5th St., W. Huntington, W. Va., secretary.

Central Wisconsin Veterinary Medical Association, the second Tuesday of each quarter (March, June, Sept., Dec.), R. J. O'Hern, P. O. Box 617, Cumberland, Wis., secretary.

Dane County Veterinary Medical Association, the second Thursday of each month. Dr. E. P. Pope, 409 Farley Ave., Madison, Wis., secretary.

**WISCONSIN**—Milwaukee Veterinary Medical Association, the third Tuesday of each month, at the Half-Way House, Blue Mound Rd., George F. Lynch, 201 West Devon St., Milwaukee 17, Wis., secretary.

Northeastern Wisconsin Veterinary Medical Association, the third Wednesday in April. William Madison, 218 E. Washington St., Appleton, Wis., secretary.

Rock Valley Veterinary Medical Association, the first Wednesday of each month. W. E. Lyle, P. O. Box 107, Deerfield, Wis., secretary.

Southeastern Veterinary Medical Association, the third Thursday of each month. John R. Curtis, 419 Cook St., Portage, Wis., secretary.

Wisconsin Valley Veterinary Medical Association, the second Tuesday of every other month. E. S. Scobell, Rt. 2, Wausau, Wis., secretary.

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(Continued on p. 61)



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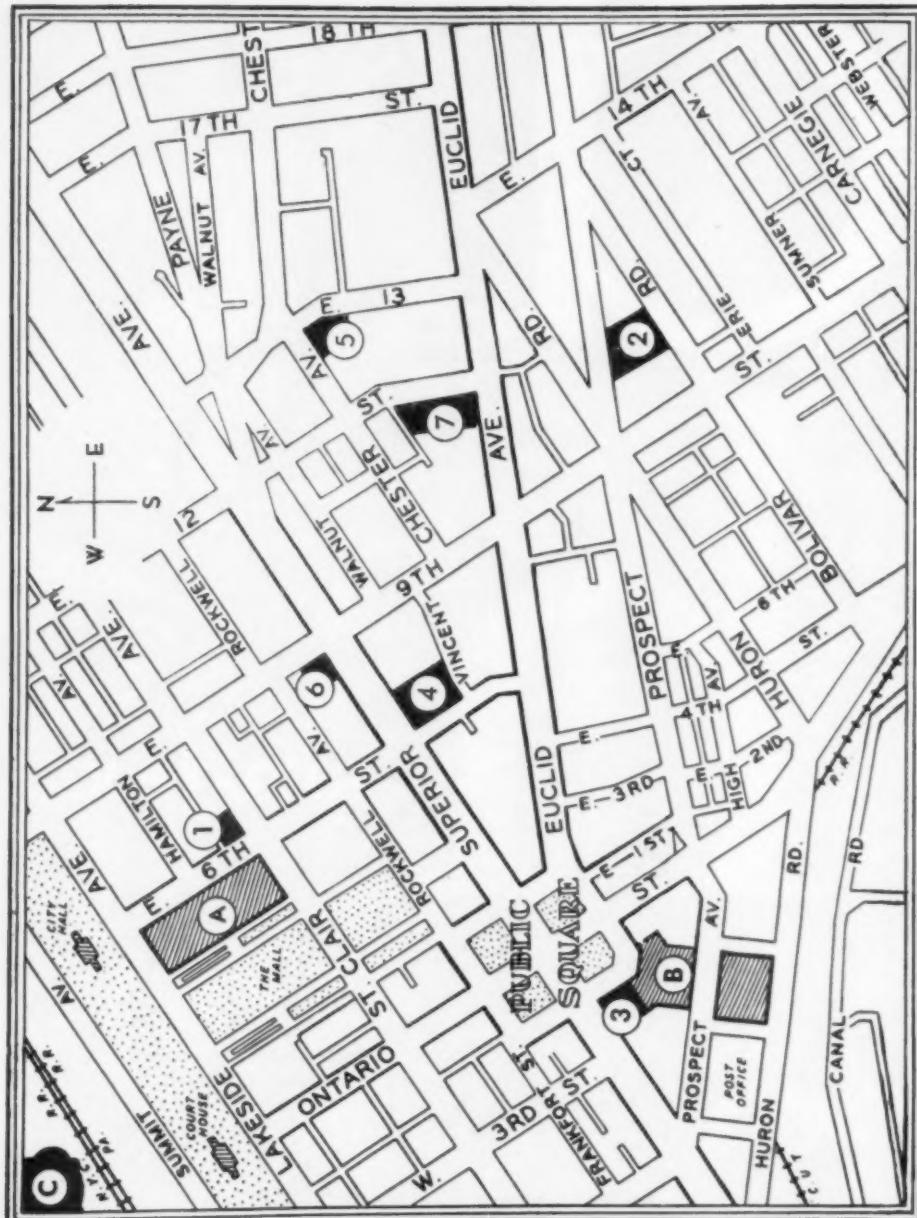


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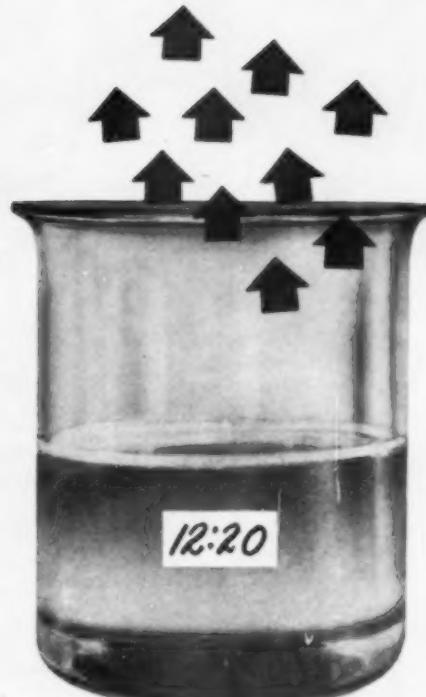
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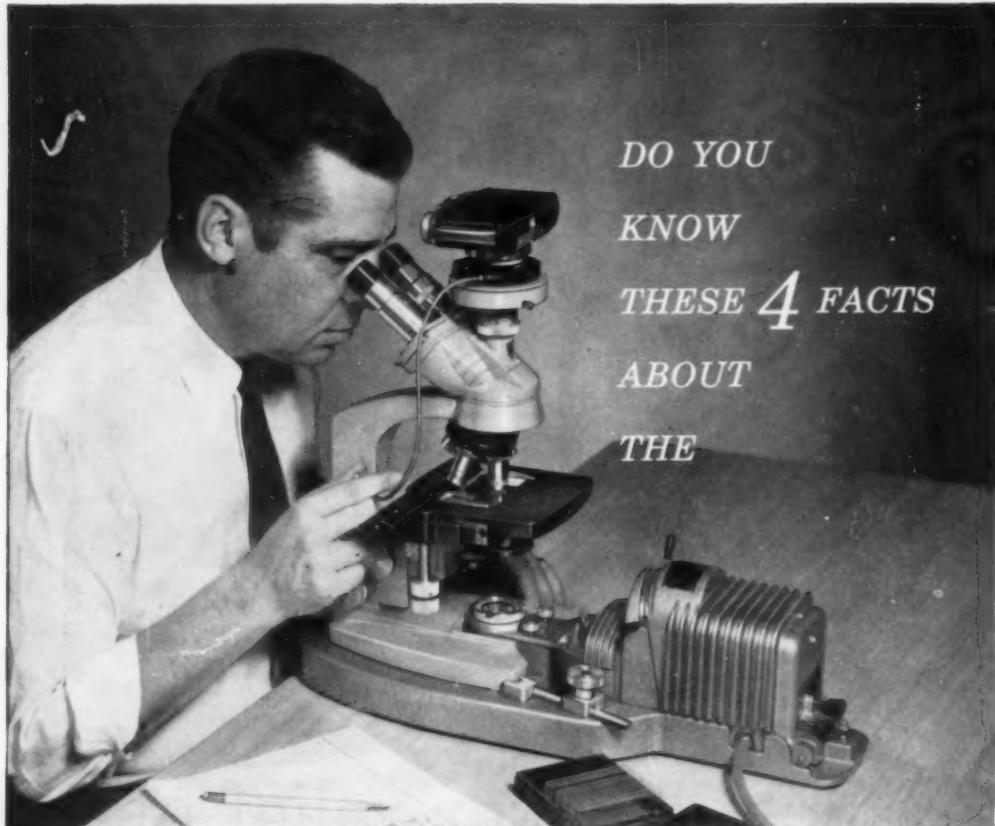
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(Continued from p. 54)

Wanted—summer work by University of Illinois veterinary student (finished 1st year) in small animal hospital. Prefer Los Angeles or Chicago south side. Address "Box K 16," c/o JOURNAL of the AVMA.

### Wanted—Practices

Veterinarian, 32, wishes to purchase small animal or mixed practice with home. Would consider partnership arrangement also. Experience: 6 years successful general practice interrupted by military; 2 years small animals (hospital staff) since discharge. Married. Licensed in Ohio, Indiana, Illinois. Address "Box K 8," c/o JOURNAL of the AVMA.

### Miscellaneous

Heavy duty veterinary chute gate—holds all sizes cattle for dehorning, doctoring, etc., \$34.88 full price. Also made in dog sizes, full price only \$15.00, freight prepaid. Free folder. Dept. V, 907 12th St., Santa Monica, Cal.

Artificial Udder—Beco Litter Feeder—nurses 8 puppies simultaneously. Stays warm; easily cleaned and sterilized. Complete unit, \$15; guaranteed. Breeders Equipment Co., Flourtown, Pa.

Breedersleve—the disposable obstetrical sleeve. Package of 25 with detachable chest band, \$5.00; lower wholesale prices. Free sample upon request. Breeders Equipment Co., Flourtown, Pa.



time's a wasting

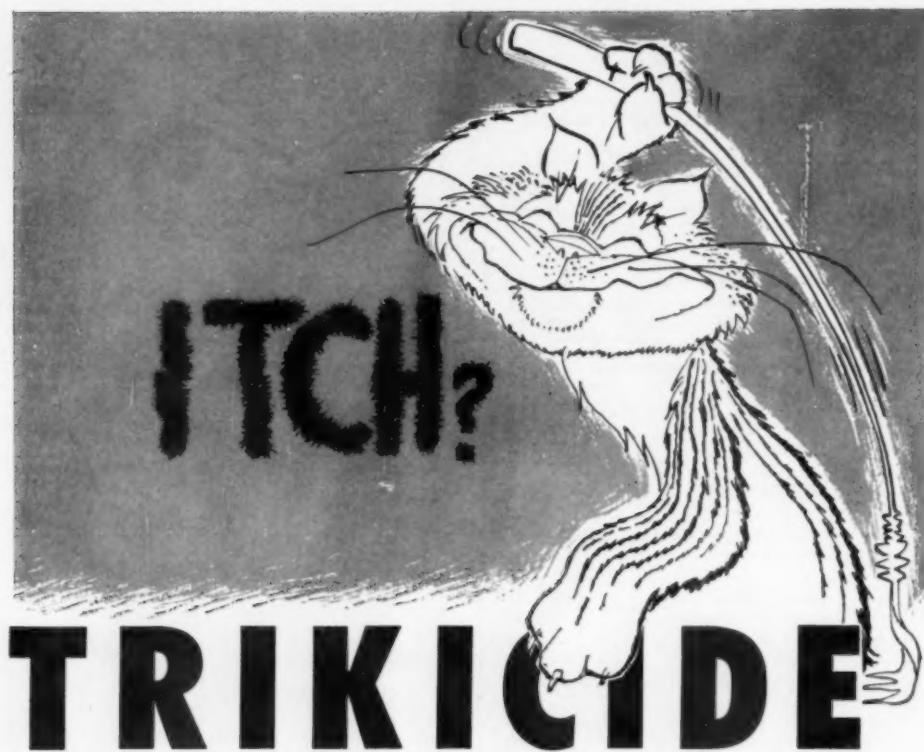
The clocks keep ticking away. We need your dollars to make each minute count in the fight against cancer.

With \$70, we can buy an eyepiece micrometer... \$48 buys a laboratory flowmeter... \$15 buys an instrument sterilizer... \$8.75 a hematocrit reader.

Only you can decide how much you can afford to send. But send it *today*, to help us keep moving ahead in the struggle to save lives.

Send your check to "Cancer" c/o your local Post Office.

**AMERICAN CANCER SOCIETY**



# TRIKICIDE

Trikicide Powder is a highly effective bactericide and fungicide for the treatment of dermatoses in both cats and dogs. A "dry" medication, it is recommended for preventing and treating ringworm, moist eczema and other weeping skin lesions, and ear canker.

The primary ingredients of Trikicide powder are 2, 2'-methylene-bis (4 chlorophenol) and oxyquinoline benzoate. Non-toxic to the host, this specially processed powder clings to the skin, promoting contact of the active ingredients with the causative agents.

Supplied: Trikicide Powder—Pkg. 12 x 1 1/4 oz. plastic spray bottles; 1 lb. hospital size.  
Trikicide Solution—12 x 4 oz. plastic squeeze bottles; gallon bottles.

Other Haver/Lockhart products for the treatment of dermatoses in small animals.

**FATONE POWDER AND CAPSULES**  
for the treatment of skin diseases due to fatty acid deficiency.

**BLUSOL**

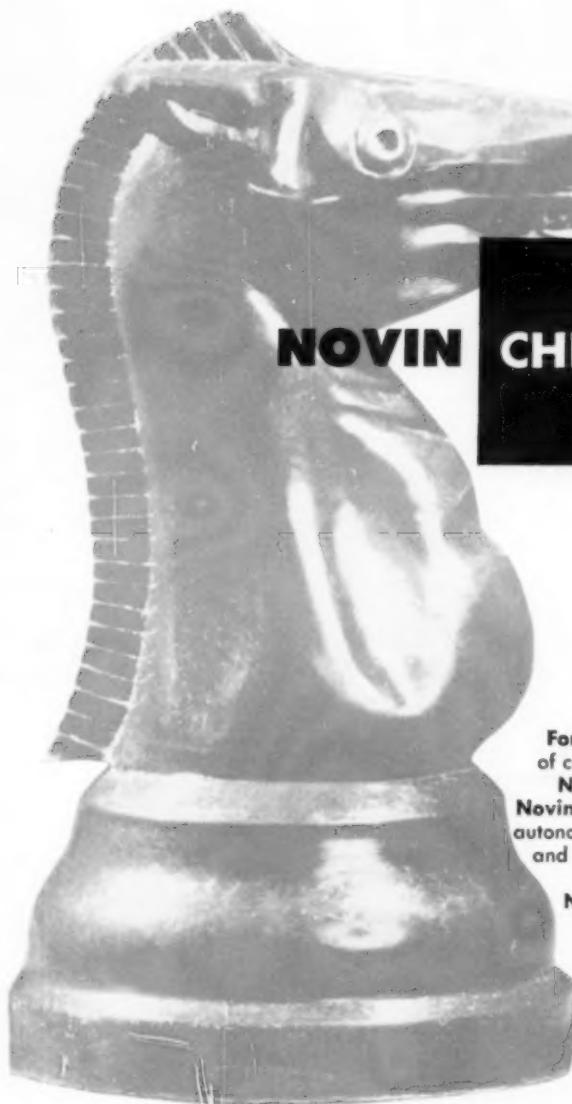
parenteral for systemic treatment of protozoan infections and selected skin conditions.



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## NOVIN CHECKS COLIC

For prompt results in the treatment of colic in large and small animals use **Novin**. Containing Dipyrone 50%, **Novin** goes to work immediately on the autonomic nervous system to relieve pain and relax the smooth muscle without affecting peristaltic movements. **Novin** is also indicated for bloat and esophageal obstructions, rheumatic pains, arthritis and myositis. Administer to horses, cattle, swine, dogs, and cats.

For relief of pain in horses and ruminants due to colic and indigestion use **Rex Drench**. Administer with a stomach tube or as a drench. **Rex Drench** also contains Dipyrone as its main active ingredient. May be used in conjunction with **Novin**.



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# *it takes all three to make a superior RABIES VACCINE*

## COMMERCIAL VACCINE COMPARISON

product ▼	1 tissue concentration	2 particle size	3 reconstitution
A ►	9%	large	very poor
B ►	10%	medium	very poor
C ►	7%	fine	fair
D ►	13%	medium	very poor
Jen-Sal ►	13%	very fine	excellent

### *maximum tissue concentration for dependable immunity*

High tissue content of Jen-Sal Rabies Vaccine provides high vaccine virus titres for maximum immune response. In critical tests, dogs vaccinated with a standard 3 cc. dose of Jen-Sal vaccine consistently withheld virulent street virus challenge.

### *homogenized tissue for rapid reconstitution*

Jen-Sal Rabies Vaccine reconstitutes in seconds. Tissue particles, minute enough to permit passage through a 24 gauge needle,

assure a vaccine which is both effective and easy to administer. No evidence of undue pain or local irritation is noted on routine administration.

### *newest production refinements give you a superior product*

Jen-Sal Rabies Vaccine contains living, safety-proved Flury virus modified by egg passage. Virus loss in storage is inhibited by new lyophilization refinements plus a Jen-Sal stabilizing agent. Meticulous control and rigorous testing guarantee a uniform vaccine of incomparable quality. Supplied in 10 dose bulk vial and 5-1 dose package.

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